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Public Works

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Bituminous Surfacing in Wet Weather

Recent Sewage Treatment Plants

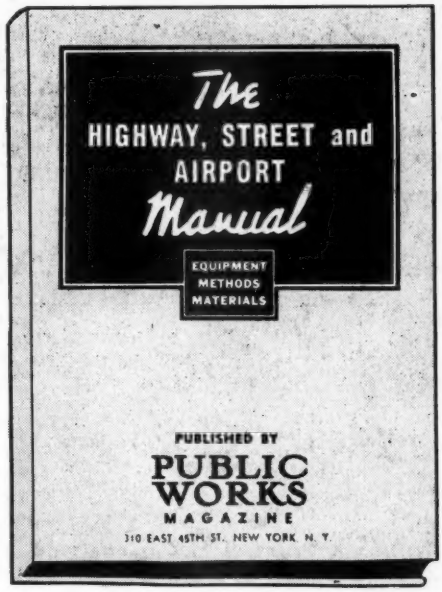
Difficult Construction of a Concrete Water Main

ANNOUNCING

The New 1945

HIGHWAY, STREET and AIRPORT MANUAL

Tells what is available, what it will do and who makes it.



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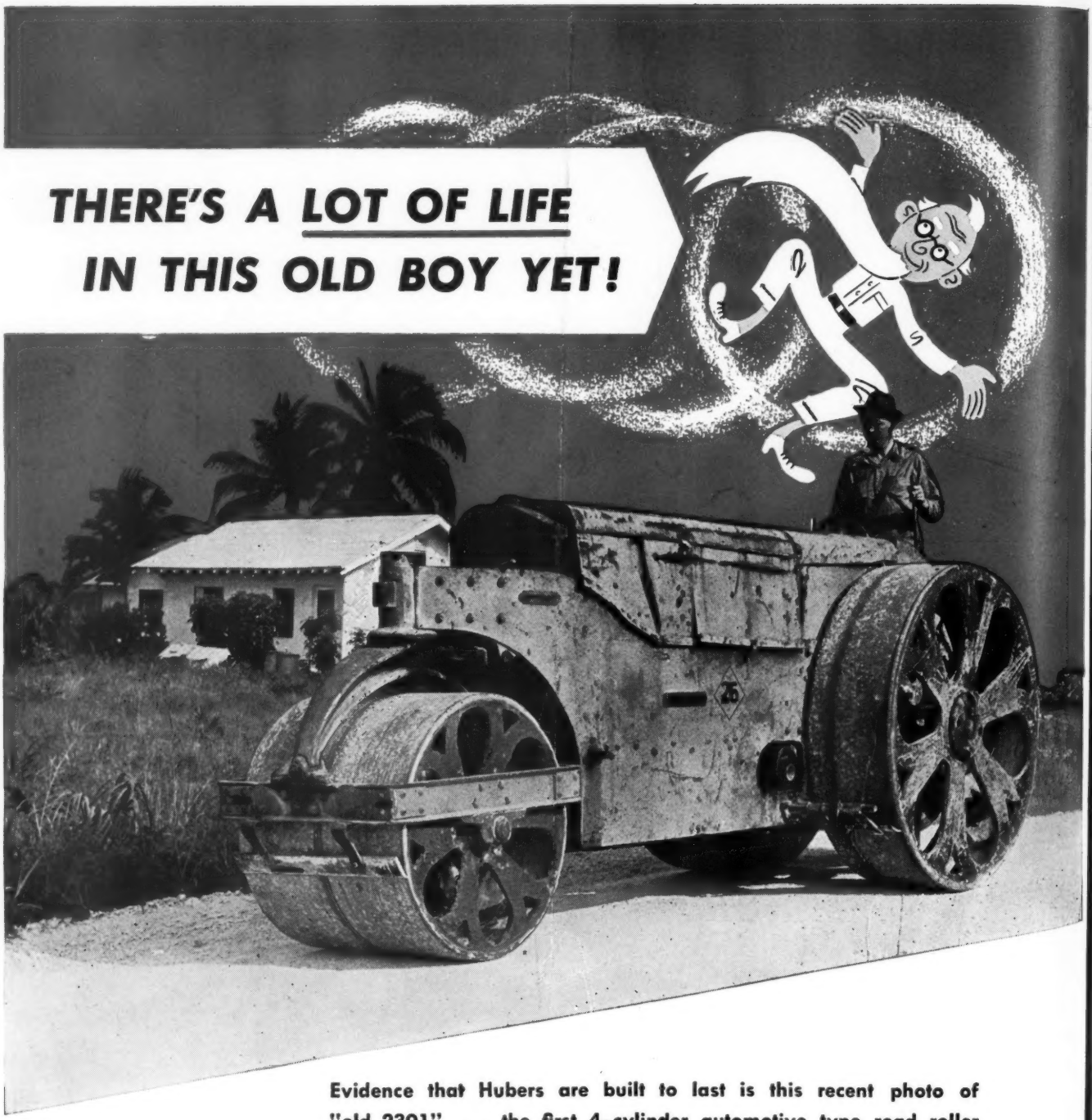

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Founded in 1896

Devoted to the interests of the engineers and technical officials of cities, counties and states

Vol. 76 No. 7

A. PRESCOTT FOLWELL, Editor

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WAR and POSTWAR EMERGENCIES

Utilities Order U-1 Amended

"An amendment of Utilities Order U-1 has been issued effective June 2, 1945 eliminating all of the restrictions affecting the *expansion* of utilities facilities except for the construction of buildings.

"U-1 no longer gives priorities assistance for building construction materials, and requires specific approval on Form WPB-2774 where the cost of materials for the construction of a building would exceed $25,000.

"No change has been made in the assignment of preference ratings except that paragraphs (b) and (c) forbid the use of this priorities assistance to get material for the construction of any buildings. New paragraphs (b) (5), (b) (6), (c) (3), and (c) (4) make it clear that the preference ratings and allotment symbol U-9 assigned in the order *may not be used* to obtain material for *major plant additions*.

"The inventory controls of Order U-1 are now applicable only to material which a utility has acquired for use in maintenance, repair, as operating supplies, or for minor plant additions. The controls on deliveries of paragraph (e) as modified by paragraphs (f) and (g) are still applicable to this class of material. A new paragraph (e) (2) provides the only control under U-1 with reference to materials required for major plant additions. Under this paragraph they may not be ordered in greater quantities or for delivery on dates earlier than required for an installation.

"In determining the quantities of material and the delivery dates which a producer may specify on his orders in accordance with the provisions of this new paragraph (e) (2), consideration should be given to the availability of manpower for the proposed installation as well as to the delivery dates for materials required.

"Paragraph (n) describes the uses of Form WPB-2774 (revised June 1) under the amended order. This application form is to be used for the following purposes only:

(1) Applications for priorities assistance for major plant additions and for materials for buildings.

(2) Applications for authorization to construct buildings where the net materials cost would exceed $25,000 for the building.

(3) Applications for upratings or other forms of special priorities assistance.

"Special priorities assistance or upratings, or preference ratings for major plant additions or for building construction will not be granted unless the material is required to maintain the supply of essential utility services or to provide utility services on time for urgent requirements."

The restrictions prohibiting the extension of lines which would duplicate facilities already installed or which constitute standby services, or which, in the case of gas facilities, would be installed for supplying gas for purposes not permitted by Order U-7 have been revoked and deleted from the amended order.

Conservation Order L41-e Amended

The first step in relaxing wartime controls on highway construction was taken on June 4 by an amendment to Conservation Order L41-e which permits the carrying on of earth-moving operations without restriction. Highway and street construction may now be started without War Production Board authorization if the work consists of:

"Grading, ditch-digging or similar earth-moving operations if no lumber or other building materials are permanently installed, except drainage pipe and culverts including headwalls thereof."

Clearing, grubbing, grading and drainage may now be undertaken without the necessity for obtaining War Production Board project authorization and may be performed in preparation for additional future construction operations. There is no dollar limitation to the grading work that may be done under this exemption. It is understood that the term "culverts" includes any minor drainage structure having clear span or lengths between abutments of 20 feet or less.

However, this exemption will have no immediate effect on projects involving federal highway funds. Such funds are either restricted to projects essential to the war effort or by law will not be available until the war ends.

Relaxation of control of construction activities in general was made by an amendment to Order L-41.

No Residual Oil for Paving

Deputy Petroleum Administrator Davies announced on June 18th that scarcity of residual oil has made it necessary to prohibit its use anywhere in the United States as a paving material. Its use was formerly banned in Oregon, Washington, California, Nevada and Arizona, and the amendment extends the restriction to the entire country. Allowance is made for commitments entered into prior to June 12th.

Delay in Planning Highway Work Serious

Plans for postwar work include spending a billion dollars on road construction. To do this to the best advantage, plans should be made for two billion dollars of work to give flexibility to the program. But the American Road Builders' Association reported in June that plans for only $685,000,000 of work had been completed, and these largely by eight states only.

Some states say that scarcity of employees capable of planning is responsible. But others have found it satisfactory to employ women for drafting or even in the field. Others have employed private engineering firms, and some have used engineering students or retired highway employees. One state trained high school students to be draftsmen.

Where there is the will, a way can be found.

PUBLIC WORKS Magazine . . . July, 1945

VOL. 76 NO. 7

General view of the sewage treatment plant of Detroit Lakes, Minnesota, population about 5,000.

Recent Sewage Treatment Plant Designs

Summary and discussion of data contained in the latest supplement of the U.S.P.H.S. census of sewage treatment plants in the continental United States.

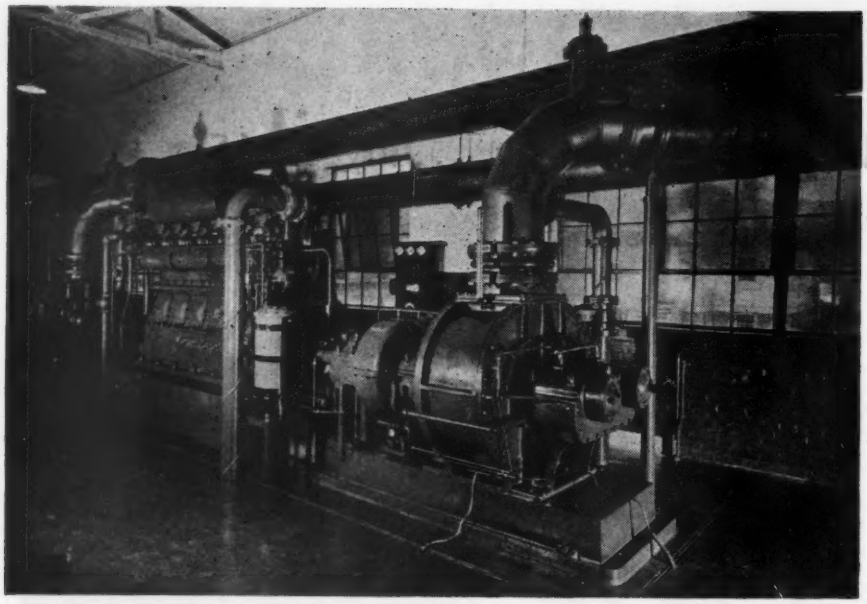
BEGINNING in 1935, the U. S. Public Health Service has been taking a nation-wide census of public and semi-public sewerage facilities in the continental United States, the data being furnished by the state health departments. Mimeographed copies of this were distributed in 1942, and supplements in 1943, 1944 and 1945. The last of these, which was completed a few weeks ago, carries the data through the year 1943, and gives the latest authoritative compilation of such information.

The 118 sewage treatment plants built or under construction that year, as reported in this census, should give a good idea of the present status of treatment design, and for that reason we have summarized and classified the data and give the results in the following article. It should, however, be remembered that this was a war year, and priorities and restrictions on machinery for civilian purposes were at their peak.

The plants included were all built or placed under construction during the year 1943. They include both new plants and additions to and revisions of existing plants. In a number of cases they were constructed to serve small sections of cities, the sewage from the greater part which was already being treated in an existing plant. Whether for complete plants or revisions, the designs probably had been made recently and represented up-to-date practice.

Details of a design are affected by a number of local conditions and considerations, and it would be impracticable to endeavor to take them all into consideration in making this summary. Perhaps the one most generally affecting the design is the size of the plant, and in this study we have used this as a basis of classification. The figures given are those of the population which the plant was designed to serve; not that of the entire city, where the new plant was to serve a section of it only; while, on the other hand, it might be considerably greater than the present population, to provide for future growth.

The population groups into which we have divided these plants are those of 1,000 or less, of which there were 26; 1,001 to 5,000, of which there were 56; 5,001 to 25,000, of which there were 26; and more than 25,000, of which there were 10.



Two Roots-Connersville 20 x 16 heavy duty blowers, capacity 4750 c.f.m. at 8 lb., driven by Worthington gas engines, at Sioux Falls, S. D., sewage plant. Over 35,000 population.

The small Dorr multdigestion system at Preston, Ida. A 45 ft. clariflocculator is shown in the right foreground. About 6,000 population.

Plants for Populations of 1,000 or Less

Some of these plants were for hospitals or other institutions, with capacities as low as 100 persons; only seven, however, were for less than 500. The municipalities in which these plants were located are as follows:

Alabama—Bay View Mines, Short Creek Mine.
Arkansas—Bauxite.
Colorado—State Mental Home.
Illinois—Crossville.
Kansas—Quenemo, White City.
Louisiana—Doyline Housing Project.
Maine—Portland (small section), Boothbay Harbor (housing project).
Mississippi—McLaurin, New Augusta.
Missouri—Concordia.
Nevada—Riepetown.
New Jersey—Masonic Home, Stirling, Wrightstown.
Ohio—Marshallville.
Oregon—Hermiston.
Vermont—Trailer camp.
Virginia—Standardsville.
Washington—T. B. Hospital.
Wisconsin—Readstown, Argyle, Cross Plains, Prentice.

Screens. None of these small plants included fine screens.

Bar or other coarse screens were used in 13 plants, one with provisions for mechanical cleaning, 8 to be cleaned by hand, and 4 did not give information on this point.

One plant installed a comminutor.

None of the plants provided grit chambers, or grease removal or skimming tanks.

Settling Tanks. Imhoff tanks were included in 11 plants.

Septic tanks were included in 6 plants.

There were 4 plain, hopper-bottom tanks.

Mechanical equipment was provided in tanks in 7 of the plants.

Filters. Intermittent sand filters were constructed in 7 plants.

Trickling filters, "standard" design, were provided in 7 plants, one using fixed nozzles and 5 rotary distributors.

High-rate filters were provided in 2 plants, one single-stage and the other 2-stage.

The sewage was applied to land in two cases, one by subsurface application, the other by "seepage to a mine dump."

Activated sludge with mechanical aeration was reported by one plant.

Ten plants provided for *chlorination,* 5 by gas, 4 by hypochlorite, 1 not specified.

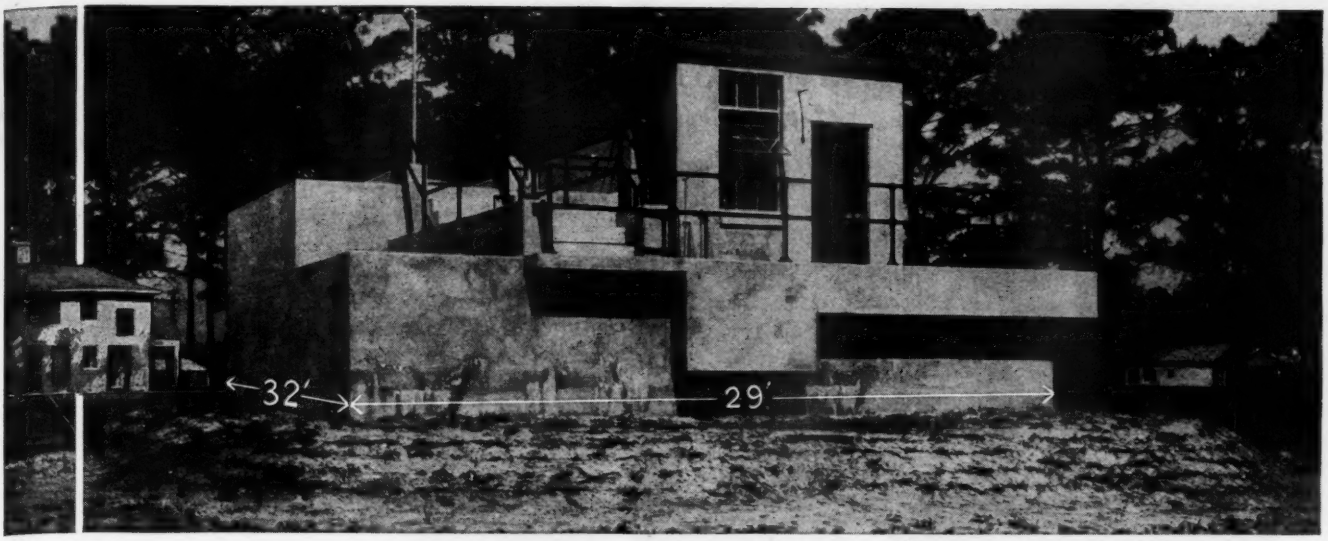
Sludge digestion was reported by 9 plants, 6 of which had fixed covers (the other 3 not specified). One used the gas for heating.

Of the 20 plants at which sludge beds were built, they were covered at one plant and open at 19.

Design Population 1,001 to 5,000

This group, numbering 56 plants, were found in the following places:

Arizona—Phoenix (hous. proj.).
California—Lompoc, San Miguel, St. Mary's College.
Florida—Starke.
Idaho—Alameda.
Ilinois—Bethalto, Freeburg, Greenup, Newton, Roodhouse, Steger.
Iowa—Ankeny.
Louisiana—Kaplan, Maplewood.
Maine—S. Portland, Kittery.
Massachusetts—Ayer, East Longmeadow.
Michigan—Clinton.
Minnesota—Brenckenridge, Detroit Lakes, Forrest Lake.
Mississippi—Centerville, Leland.
Missouri—Mountain Grove, Newburg, Rolla.
Nevada—Hawthorne.
New Jersey—Englewood Cliffs, Jamesburg, S. Bound Brook, Westville, Alfred Vail Homes.
New York—Mineville, Celeron, Cochocton, Gasport.
North Carolina—Booneville.
Ohio—New Concord.
Oregon—Ordnance, Wood Village.
Pennsylvania—Kobuta, Littlestown, North Wales.
Rhode Island—Wickford (hous. proj.).
Tennessee—Alcoa.
Utah—Dragerton (hous. proj.).
Virginia—Dublin, Norfolk (hous. proj.).
W. Virginia—White Sulphur Springs.
Wisconsin—Amery, Crandon, Evansville, Manawa, Muscoda.



This Chicago "Packaged" Sewage Plant is almost in the front yard of the East End Homes Housing Project at Biloxi, Miss. It was installed above ground because the water table was very close to the surface.

Screens. One plant included fine screens.

Bar screens or other type of coarse screens were included in 28 plants. Of these, 9 were reported as being hand cleaned, none as being mechanically cleaned; this point was not reported on by the other 19.

Comminutors were included in 17 plants.

Grit Chambers. Five plants included grit chambers, none of them with continuous removal mechanism.

Settling Tanks. Imhoff tanks were included in 23 plants.

Septic tanks in 2 plants.

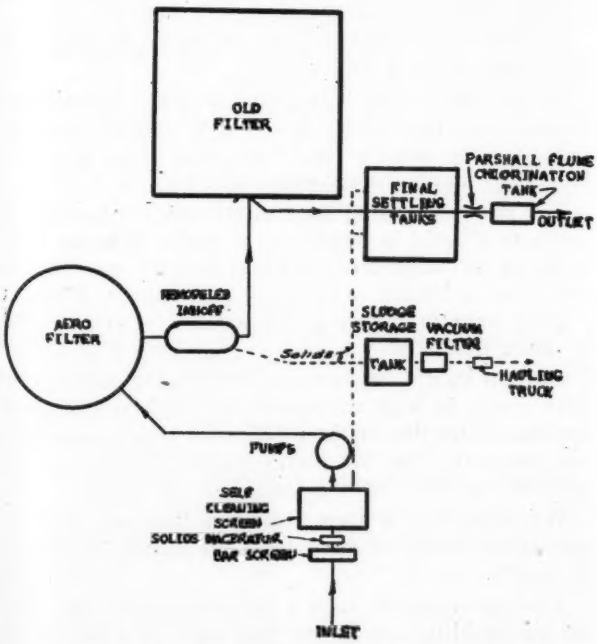
Plain tanks were included in 43 plants. (In some plants both plain and Imhoff tanks were provided.)

Mechanical equipment was provided in tanks in 24 plants.

Filters. Intermittent sand filters in 4 plants.

Trickling filters, "standard" design, in 22 plants, 19 with rotary distributors, 3 with fixed nozzles.

High-rate filters in 7 plants, 5 single-stage and 2 double-stage.



Diagrammatic plan of Detroit Lakes treatment plant.

Land Application. This was reported for 6 plants; one with cropping, one by sub-surface application, 4 not specified.

Activated Sludge. Of 9 activated sludge plants reported, 7 use mechanical aeration and 2 use diffused air.

One plant used plain aeration without sludge return.

Chlorination. This was provided for in 31 plants. Of these, 24 used chlorine gas, 1 used hypochlorite, 6 failed to specify which.

Separate Sludge Digestion. Of 26 plants that include sludge digesters, 14 used fixed covers, 2 had floating covers, one had a gasometer cover, 3 were open, 6 not specified. Gas was used for heating in 14 plants. Gas storage in a separate holder was provided in one plant.

Stirring or concentrating mechanism was provided in 3 plants.

One plant was a two-stage.

Sludge Beds. Of 49 plants that included sludge beds, these were covered in 5 cases, open in 39 cases, not specified in 5 cases.

A *Skimming Tank,* mechanically equipped was installed in one plant.

Application to Land was practiced at three plants, one by irrigation, one "to waste land," and one to filtration ponds.

Design Population 5,001 to 25,000

This group includes the 26 communities listed below.

Alabama—Chickasaw, Talladega.
California—Alisal, San Louis Obispo.
Georgia—Marietta.
Idaho—Preston.
Illinois—Carbondale, Marion.
Indiana—Clinton.
Louisiana—Leesville, Minden, New Iberia.
Mississippi—Biloxi.
Nevada—Las Vegas.
New Jersey—Butler, Long Branch, Maywood.
New York—Belgrave, Great Neck.
Ohio—Windham.
Pennsylvania—Lacey (hous. proj.), Waynesburg.
S. Dakota—Sturgis.
Tennessee—Tullahoma.
Washington—Kirkland, Renton.

Screens. Bar or other coarse type of screens were constructed at 10 plants, hand-cleaned at 8, mechanically cleaned at 1, and 1 not specified.

(Continued on page 40)

Vacuum leaf loader attached to side of truck, and dust bag cover on top of it.

A Vacuum Leaf Loader

By DWIGHT D. DILWORTH

Acting City Manager, Montrose, Colorado

OUR annual harvest of leaves has always presented quite a problem of loading and hauling away. Due to the character of cottonwood and poplar tree leaves, it is not advisable to leave them on the lawn during the winter months, and we have such a short period of time between a killing frost and our first snows that speed in removing them is necessary.

It had been customary for the citizens to rake their leaves into large windrows or piles along the curb, and the city hired extra men for this period and loaded the leaves with large forks and slings onto the trucks. However, this was a rather slow process and last year we were unable to hire any additional men. But the leaves had to be hauled, so I went to the shop men with an idea of a vacuum loader. A search was started to see what could be obtained and put together in a hurry.

We were unable to locate a fan as large as we would have liked, but had to use one with a six-inch opening, which originally had been the blower on an insilage cutter at an elevator. A four-horsepower one-cylinder air-cooled motor was idle in the shop. Mounting these two on a 3 x 12 plank and coupling them together with a universal joint was a short job. Next we made a frame from some flat iron, with hooks so that it would hang on the outside of a dump truck, and this much was ready.

A framework the size of the truck body and extending four feet above it to furnish additional capacity was fastened to the truck, and the sides and top of this were covered with burlap to serve as a dust bag; all seams in the burlap and its connection with the truck body being made air tight.

From the fan outlet to the side of this dust bag near the top we placed a six-inch pipe with a long curving elbow to insure free passage of sticks.

For the pickup end or suction pipe we tried to locate a flexible pipe. Not being successful, we called on the tinsmith to make us a solid six-inch pipe with a joint near the fan. This worked fairly well but I believe the flexible pipe would be better.

We were now ready to see whether our time had been spent usefully or otherwise.

At the time we put it in operation six men were employed using two trucks. It was soon evident that two men with the loader could load more than twice the amount of leaves the six men could load by hand.

The most surprising part to me was the amount of leaves that could be loaded on a truck. Blowing them in by air so compacted them that at least five times as many can be loaded in the same given space. This was a great help in reducing the number of trips to the dumping grounds.

Caution should be exercised in keeping small rocks from going in with the leaves. We had to straighten the fan blades two or three times for this reason. It is also necessary that the leaves are not too wet or they will ball up and clog the fan.

We built this in such a manner that two men can remove or install it on a truck in fifteen minutes if necessary.

This proved to be such a time and labor saver that we are building one larger and more of a permanent design for the coming season.

How Officials of Two Cities Expedited Leaf Collection

Two ingenious devices constructed by city officials, one using a portable air compressor for windrowing leaves, the other a motor and blower for transferring windrowed leaves to a truck.

Windrowing Leaves With an Air Compressor

By RALEIGH B. GREEN
Superintendent of Public Works, Dinuba, California

DINUBA, California, has had a very noticeable increase in population during the war, which means an increase in maintenance in our various departments. However, we have not increased our personnel, but have learned to take short cuts and use what equipment we have on hand to a greater advantage. One instance of this is saving time and labor in removing leaves from our parks by use of an air compressor.

We have a ten-acre park seeded in lawn and several smaller ones planted mostly and densely with sycamore trees. Heretofore in the fall of the year, we have had to rake the leaves in these parks by hand with leaf rakes and haul them away, which required four or five men about two weeks at two or three different times before the final clean-up. This fall, we were so rushed with other work that we decided to wait until all the leaves had fallen and clean them all up in one raking. When the time came to gather our crop of leaves, which had carpeted our park six or eight inches deep, we attached a hay rake behind a pickup truck and were able to rake into windrows about 75% of our crop, still leaving a two-inch carpet of leaves to be raked by hand.

Raleigh B. Green
Superintendent of Public Works
Dinuba, California

Device for windrowing leaves, using a Worthington portable air compressor.

Early one morning I decided to do a little experimenting with our Worthington portable air compressor to see if I could improve on our long and costly job of leaf raking. I fashioned a nozzle from a piece of ½" light-weight conduit 5 ft. long, placing a throttle valve at one end and flattening the discharge end so the air would come out in a fan-like way. I found that, using this nozzle, I could blow our leaves together into windrows faster than many men could rake them by hand. My experiment was put to the test, one man operating the air compressor and blowing the leaves into windrows and three men loading and packing the leaves into a truck and hauling them away to a place to dump (generally to some farmer's vineyard for fertilizer). In less than a week's time the job was completed. We had raked and hauled away approximately forty truck loads of leaves. (Our truck body had a capacity of 276 cu. ft.) This operation represents 176 man-hours of work, compared to a very conservative figure of 452 man-hours for the old hand method. This constitutes a man-hour saving of approximately 276 to 300 man-hours for this particular job.

Los Angeles Beaches Still Quarantined

State enforcement of the Quarantine of Los Angeles beaches in Santa Monica Bay (previously noted in PUBLIC WORKS) will be intensified with the opening of the summer recreation season. All persons will be excluded from the 10 miles of beaches most accessible to the citizens of Los Angeles until that city makes such radical improvements in its sewage disposal system at Hyperion as are provided for in the proposed $10,000,000 bond issue.

W. A. Kunigk

A Difficult 54-In on

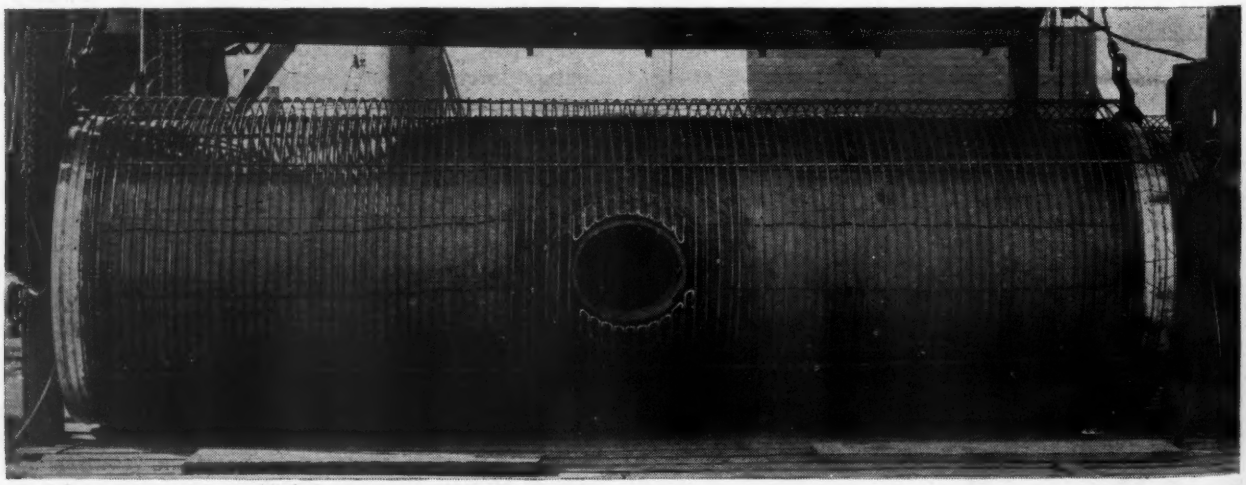
By W. A. KUNIGK
Superintendent, Water Division, Tacoma, Washington

DURING the fall of 1944 the Water Department of the City of Tacoma, Washington carried out the replacement of 12,251 ft. of 46" diameter continuous wood-stave pipe with an equal length of 54" diameter steel cylinder Lock Joint concrete pipe. The wooden pipe being replaced was part of the original Green River gravity supply conduit completed and placed in service during the spring of 1913. This section of pipe was in very poor and dangerous condition because its replacement was overdue by at least two years beyond the date of its estimated safe service life. Restrictions in the availability of material and manpower were responsible for this delay.

In reconstructing the original 1913 gravity pipe line, the Water Division has followed a prepared schedule of replacing each year the section or sections that have been designated for replacement. This program of scheduled replacements was worked out during 1923, when it became troublesome to maintain certain sections of the pipe line in service. During that year, test pits were put down in sufficient number along the entire 41-mile section of the wooden portion of the gravity pipe line for the purpose of collecting information so that estimates could be prepared for determining the remaining years of useful life of each mile of pipe. At each test pit the pipe was exposed and a record made of the station, diameter of pipe, thickness of staves, band spacing, normal working pressure, maximum depth of decay in the staves, nature of soil, depth of soil cover, ground water conditions, corrosion of steel bands and shoes, and such other facts as would be helpful in fixing the year and estimating the cost of replacement.

On most of the reconstruction work carried out by the Water Department, the leaky condition of the old pipe and the close proximity in which the new pipe had to be installed because of right-of-way and other restrictions, have been some of the troublesome factors. On account of the hazards of maintaining the single gravity supply line during construction and the danger to the principal water supply of the city, the Water Department has on practically all gravity pipe line reconstruction performed, with its own equipment and organization, the clearing, excavation of the ditch, preparation of subgrade, unwatering and maintenance of the ditch during construction, as well as the reclaiming of the old pipe line, reconditioning of roads, telephone line, etc. This, of course, included also any protective measures that had to be taken, such as bracing and under-pinning to prevent movement and collapse of the old pipe, any temporary repairs to prevent excessive leakage, and all necessary intercepting and diverting of surface drainage. These problems were especially difficult in the soft ground found near Enumclaw. The fact that on all construction of the new pipe line the grade had to be lowered from 1.5 to 3 feet below that of the old pipe, added considerably to the difficulty in carrying out this work.

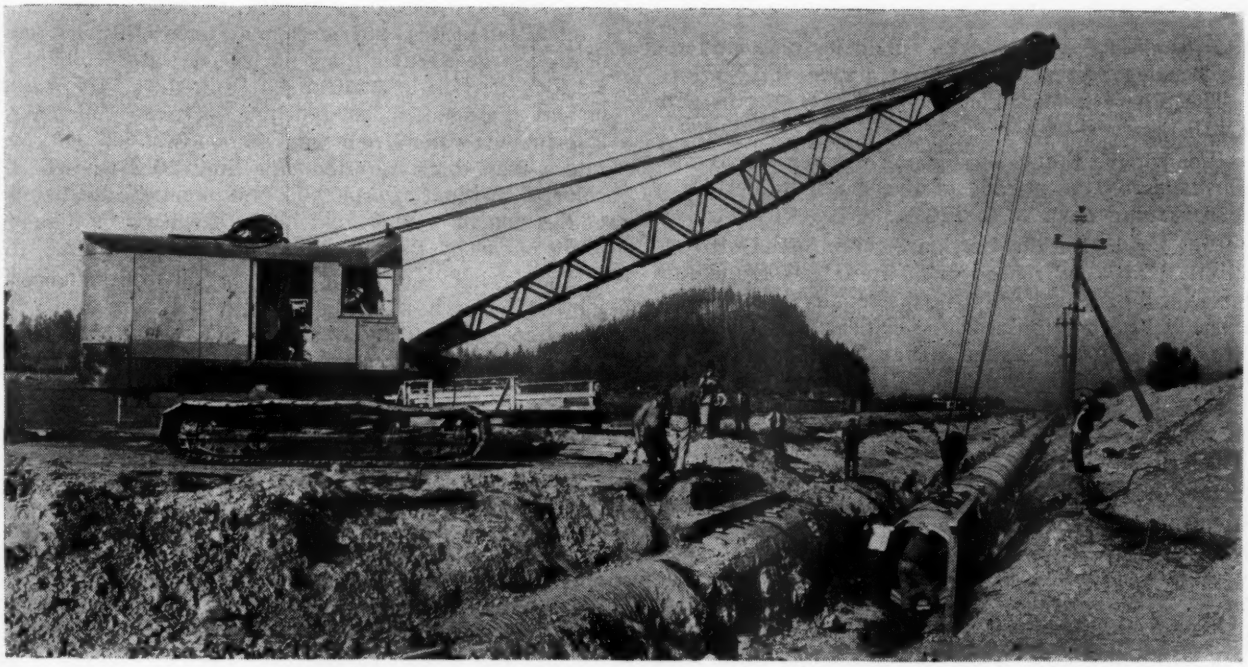
In the replacement of the 7,778 ft. section near Enumclaw about 1,500 ft. of peat bog was encountered, in which the water table was practically at the ground surface. The depth of this peat soil was over 13 ft. in places. It was very difficult to maintain a ditch of the required width and depth in this material and the only way that this could be carried out successfully was by continuous pumping at a number of



Typical assembly of steel cylinder and reinforcement cages for 54" diameter concrete pipe, showing placement of reinforcement around manhole casting.

-Inoncrete Pipe Line Installation Job

Paralleling, at a lower level, a leaking 46-inch wood-stave pipe. Construction through a peat bog and other soft ground. Designing, laying and testing the pipe.



Laying Lock Joint concrete pipe, each 16-ft. section of which weighed 21,000 pounds.

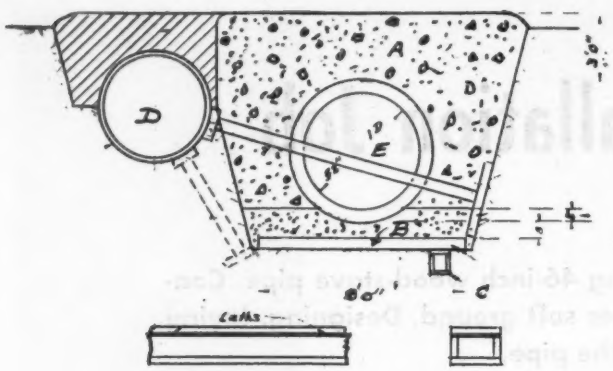
points, lowering the ground-water table well below the pipe line subgrade. The ground-water seepage was drained into pump sumps by a wood drain-box installed below subgrade, as indicated on the typical cross section of the ditch.

Subgrade was usually excavated from 12″ to 18″ below flow-line grade and this material was replaced for the same depth with pit-run sand and gravel. In the extreme soft spots puncheon of fir timber was placed in the bottom of the ditch before placing the material for the subgrade cradling. The subgrade material was spread along the bottom of the ditch with a small 20 h.p. Cletrac bulldozer equipped with an Isaacson hydraulic operated blade. The subgrade was then screeded by hand to exact line and grade and the pipe laid on this foundation.

Propping up old 46″ wood stave pipe while excavating in difficult ground for new concrete pipe.

The contractor had to manufacture and install the pipe, test and chlorinate same after it had been laid, and place the protective backfill to an elevation of 12″ above the new pipe. Wherever flooding of this protective backfill was necessary to prevent after settlement, the contractor had to carry out that part of the work. Where the excavated material was not suitable for backfill (as was the case through the peat soil near Enumclaw), the city provided suitable backfill material for this purpose delivered in the ditch. The contractor on this job was the American Pipe and Construction Company of Tacoma, Washington, and the type of pipe furnished was their standard Lock Joint steel cylinder reinforced concrete pipe with rubber gaskets, as shown in the illustration. Some of the requirements of the specification were as follows:

For the Enumclaw Section, the contractor furnished



Typical trench in peat soil.

A—Backfill with bank-run sand and gravel. B—Puncheon placed edge to edge. C—Drain box. D—Old wood-stave pipe. E—New concrete main. Drain box detail.

and installed 7,778 ft. of 54″ diameter pipe, and for the Buckley Section 4,473 ft., or a total of 12,251 ft.

The pipe was manufactured in 16 ft. lengths with a wall thickness of 6″.

Pipe for the Enumclaw Section was reinforced with two cages on the outside of the steel cylinder for a head varying from 90 to 120 ft.

Pipe for the Buckley Section was reinforced with one elliptical cage for a head of 60 ft. It was found that for a head of less than 60 ft. the requirements for the external loading produced the critical stress. The external loading tests called for an edge load of 2,750 lbs. per linear foot applied by the three-edge bearing method in the A.S.T.M. specifications for reinforced culvert pipe C-76.

For the steel cylinders, No. 14 U. S. standard gauge commercial grade blue annealed steel of a minimum strength of 45,000 p.s.i. was used, being the only kind of steel available for this job. The allowable working stress used was 11,250 p.s.i. All steel cylinders were tested hydrostatically to 18,000 p.s.i. stress in the plate.

Reinforcing bars of ⅜″ to ⅝″ round steel were used, having an ultimate strength of 70,000 p.s.i. for the intermediate grade and 60,000 p.s.i. for the structural grade. The working stress for the former was 16,000 p.s.i. and for the latter 13,714 p.s.i. Permissible spacing of the bars was from 2″ minimum to 4″ maximum. Bars were rolled to the standard A.S.T.M. specifications for billet steel bars for concrete reinforcement. Serial Destination A-15.

The concrete mix specified was 1 part cement to 1¾ parts of sand and 2¼ parts of gravel, with slight permissible variations for the purpose of workability and density. Crushing strength test of concrete had to develop 3,000 p.s.i. in seven days and 4,000 p.s.i. in 28 days. Permissible working stress in compression was 1,000 p.s.i. Steam curing of not less than ten hours duration was required at a temperature from 100° to 130° F.

The hydrostatic field pressure test required, after the pipe had been installed and bulkheaded off at each end, called for a test pressure of 150% of the maximum pressure under which the highest point of the section would operate, but in no case was the minimum head at the lowest point to be less than 120 ft. This test was continued for a period of five hours, and the maximum permissible leakage in 24 hrs. while under this pressure was 100 gallons of water for 1″ of internal diameter of pipe per mile. The results of this test for the Enumclaw Section indicated an average of 22.96% of the allowable for the five-hour period, and for the Buckley Section 38.03%. On the Buckley Section the recorded leakage included some seepage through one of the bulkheads, which could easily have accounted for the different results in the two tests. In connection with these tests it was interesting to note that the leakage decreased steadily throughout the test period and at the end of the five-hour period it was only a fraction of the average indicated. If the pipe had been permitted to stand under pressure for several days longer, it would have been possible to reduce the recorded leakage to a much smaller percentage of that here shown.

Both sections were chlorinated before being placed in service with a dosage of 100 p.p.m. by weight. On the Enumclaw Section some fish were killed when the treated water was discharged into a small creek that had been stocked previously. In order to forestall a repetition of this experience, the State Pollution Commission ordered that the chlorinated water from the Buckley Section be neutralized before it would reach one of the small stocked fishing streams. When the chlorinated water from this section was discharged into a road ditch near the pipe line it still showed a chlorine residual of some 40 to 60 p.p.m. Neutralizing of the effluent was effected in the ditch with a dosage of 50 p.p.m. by weight of sulphur dioxide.

The laying equipment used by the contractor on the Enumclaw Section was a 3½-yard Northwest 95 D dragline equipped with a 60 ft. boom. This heavy equipment was necessary for laying the 21,000-lb. sections of pipe because of interferences by a high-tension transmission line, a telephone line and a drain ditch, all paralleling the pipe line ditch. Operating through the peat bog, this equipment had to move on 6 ft. x 18 ft. mats made up of 12″ x 12″ timbers.

Equipment used by the contractor for laying on the Buckley Section was a Northwest 80 Crane. A Coffing hoist was used on all pipe laying operations for pulling pipe into the socket or bell of the preceding section laid. A Caterpillar 50 tractor bulldozer was used for placing the protective backfill. The city used a 1¼ yard Northwest hoe shovel and a ¾ yard Northwest dragline for excavating the ditch. A Lorain truck-mounted ⅜ yard clam-shell was used for keeping the ditch clean from sloughing and moving ground. Besides the 20 h.p. Cletrac bulldozer already mentioned, from three to five bulldozers of 30 to 70 h.p. were used for clearing, back-filling and road building operations. In taking care of the ground water and leakage from the old pipe, the city used one 6″, three 4″ and three 2″ Jaeger pumps, one 3″ Rex and one 2″ Marlow pump.

The total cost of the project was $439,743.51. The force account part of this work carried out by the City Water Department was in the amount of $152,149.76. On account of the war-connected need, this project was financed to the extent of 35% of its total cost by the Federal Works Agency, represented in this area by L. R. Durkee, Division Engineer, Seattle, Washington.

The personnel of the contractor on this work was Bruce E. Fagg, General Superintendent, and Thomas Wilcox, Field Superintendent.

For the city, the design and supervision of construction was under the direction of the writer, with Lothrop Crosby, assistant in the office, and J. A. Kuehl, resident engineer in the field. The Water Department is under the general direction of C. A. Erdahl, Commissioner of Public Utilities.

Repairing Undermined Abutments

How a county engineer placed underpinning under the abutments of several bridges which had been undercut by excessive floods.

By H. A. ROWLAND
County Engineer, Ellsworth County, Kansas

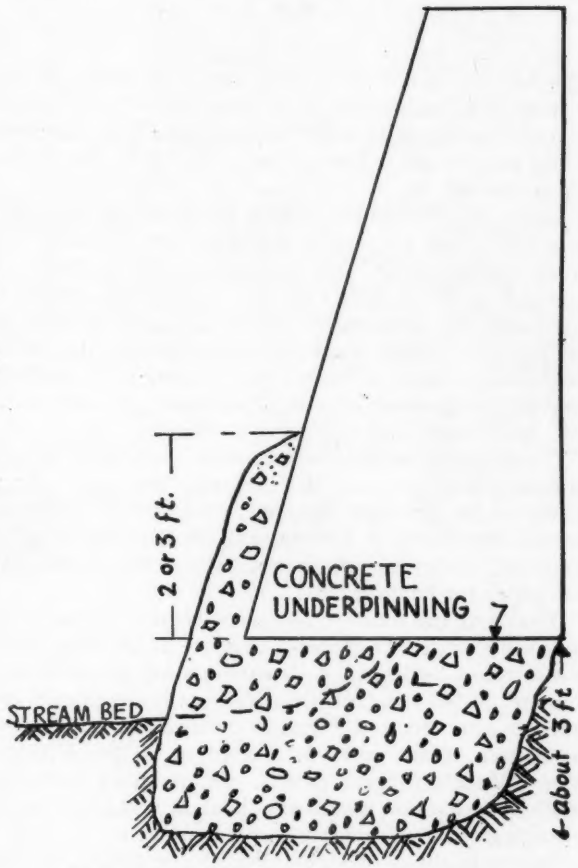
FLOODED streams caused by a number of excessively heavy rains during the past three years have severely damaged a number of small bridges in this county, chiefly by cutting down the stream bed two or three feet below the level that obtained at the time the bridge was constructed. In most cases the base of the abutment was exposed and in some places had been undercut to such an extent that a portion of the abutment had slumped. This erosion was due to the fact that the abutments of these bridges had been placed too close together, so contracting the channel that the water headed up above the bridge and flowed under it with great velocity.

In most of these cases a new bridge of longer span should have replaced the old one, but shortage of labor and materials made this impossible and it was necessary to repair the weakened abutments and do what was possible to prevent future damage of this kind. In doing this, the abutment was shored up, and then was underpinned with a concrete foundation placed below the original base. In placing this underpinning, a narrow pit was dug about 3 ft. deep below the abutment and extending to the back of same, and this was filled with concrete. Then another narrow pit was dug and filled; and this was repeated until the entire abutment had been underpinned. This concrete underpinning extended a little in front of the abutment, and the concrete was carried up two or three feet onto the face of the old abutment, forming a lining several inches thick to strengthen and protect it.

With the aim to prevent further erosion between the abutments, the channel under each bridge and for several feet below it was paved with large-size stones. In some cases the channel had originally been paved with concrete between the abutments but not downstream from them, and the swift current had washed out the soil back some distance from the down-stream edge of this floor. These holes we filled with stones; using no cement, for I have noticed that where this was used the bottom stones settled, leaving an open space below the cemented stones through which the water flowed, making matters worse than they were before. Leaving the stones uncemented, they were free to settle into a compact mass which the water would flow over.

This is a general description of the work but details varied with each bridge. Some of this work was done over two years ago and everything seems to be all right and gives promise of lasting indefinitely.

Since starting to write the above I have been informed that another bridge has gone wrong and probably the same remedy will be applied to it.



Sketch section of wall and underpinning.

Maine Waterworks Men in the Armed Forces

Probably few of us realize how many waterworks men have been taken into the armed forces. The Maine Water Utilities Association lists 36 of its members who are absent with the forces (one is a woman, in the WAVES). And possibly there are other Maine waterworks men who are not members of the Association. And Maine contains less than one one-hundred-and-fiftieth of the population of the country. If the rest of the country has contributed at the same rate, there are more than 5500 waterworks men withdrawn from their peacetime services.

Of the Maine men in the war services, 11 are in the Army, 12 are in the Navy, 4 are Seabees, and the others are with the USMC, USAAF and USPHS.

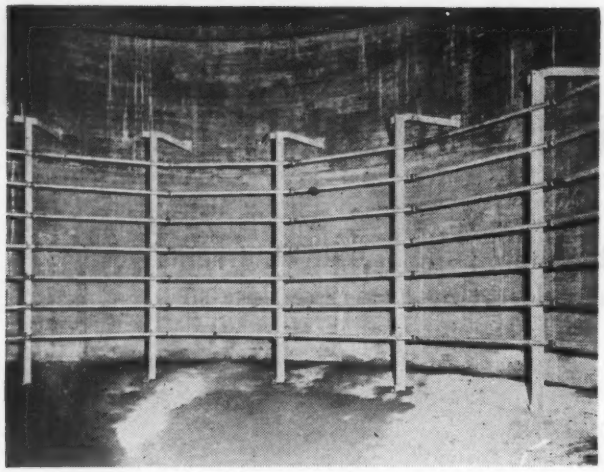


Fig. 1—Heating coils in the Ley Creek digestion tanks of Syracuse, N. Y.

Heating Coils

PRACTICALLY all sludge digestion tanks, except very small ones, that have been built during recent years contain provision for heating, usually in the form of hot water coils, the water being heated by the sludge gas produced.

These coils are more subject to corrosion than perhaps any other parts of a treatment plant, partly because of the heat, tests indicating that activity of corrosion doubles with each 20° increase in temperature; and the temperature of the sewage adjacent to the pipes is higher than that surrounding any other structural member. Also access to them, to learn their condition and make repairs if necessary, is very difficult, unpleasant and expensive to effect.

Therefore the material of which they are made should be chosen with care, so that they may have not only a maximum of corrosion resistance, but also a maximum thermal conductivity. For many digestion tank installations, the designing engineers have selected wrought iron pipes for heating coils.

Details of the location and construction of the coils vary somewhat. The general practice is to place them in a series of horizontal coils surrounding the tank and from 6″ to 36″ distant from the wall; supported by brackets attached to the wall or by uprights resting on the bottom of the tank. An exception is found in the Dorr "Multdigestion" plants, the primary tank of which is heated by means of "heat exchangers," each consisting of four or more vertical pipes.

Several methods of supporting the heating coils are illustrated by the accompanying photographs. These were kindly furnished to us by the A. M. Byers Co., and presumably their wrought iron pipes were used in the installations shown.

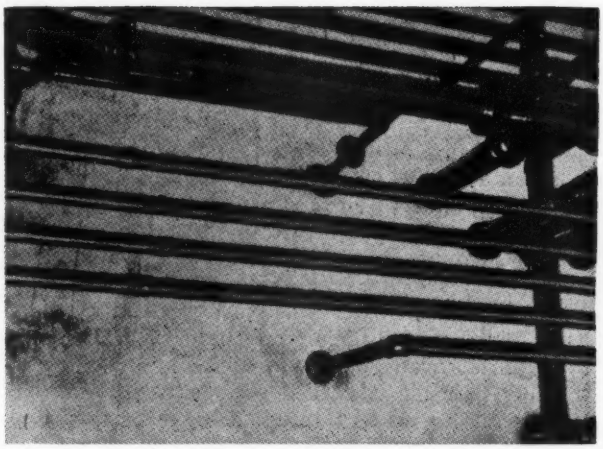


Fig. 2—2½″ wrought iron coils in tanks at Marion, Ind.

Fig. 1 shows the heating coils in the sludge digestion tanks at the Ley Creek disposal plant in Syracuse, N. Y. They were fabricated from 1½″ and 2″ galvanized wrought iron pipe. The designs for this plant

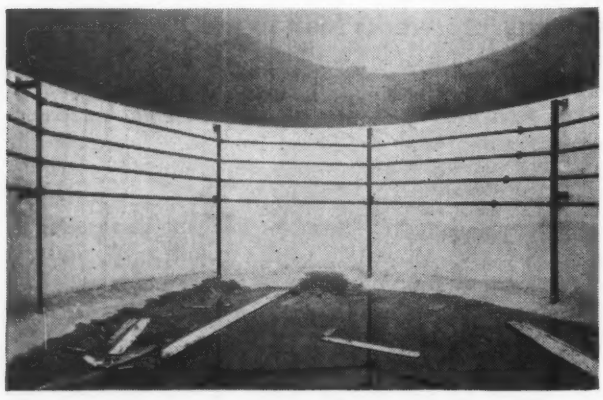


Fig. 3—Heating coils at Phoenixville, Pa.

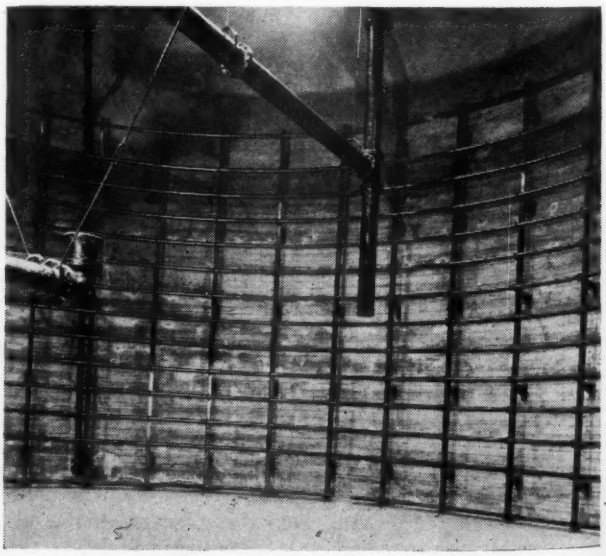


Fig. 4—Digestion tank at the Metropolitan District of Hartford County plant, where 7,300 ft. of 2½″ w. i. pipe was used for heating coils.

ludge Digestion Tanks

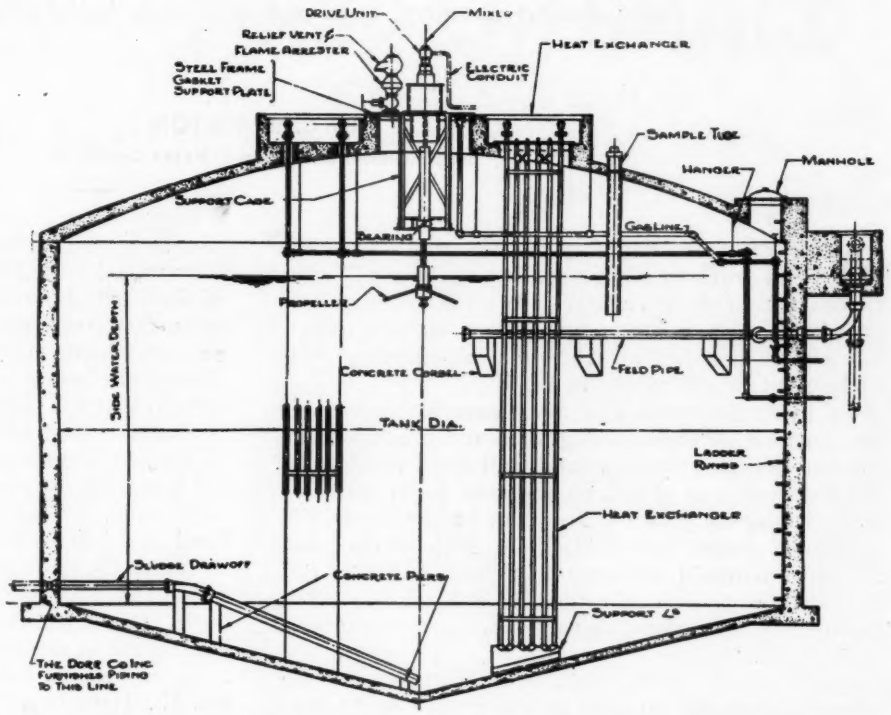
Illustrations of methods of arranging and supporting the pipes used for heating tanks in large and small plants located in five different states.

were prepared under the direction of Glenn D. Holmes and Earl F. O'Brien, consulting engineers.

The disposal plant at Marion, Indiana, was designed by Consoer, Townsend and Quinlan, consulting engineers, of Chicago. Fig. 2 shows the 2½" black wrought iron heater coils in the sludge digestion tanks. The supports for these coils were fabricated from over 7 tons of wrought iron plates, bars, and angles.

Fig. 3 shows heating coils in the Phoenixville sewage disposal plant, Phoenixville, Penna. The plant was designed by Friel and Albright, engineers.

In the digestion tanks at the Metropolitan District of Hartford County disposal plant, 7,300 feet of 2½" black wrought iron was used for steam heating coils. The radius of the coils is 50 feet, and all joints were welded. Fig. 4 shows the coils being installed. The engineers of the Board of Construction and Repair, Metropolitan District of Hartford County, Connecticut, designed the plant.



Sectional elevation of Dorr Type M digester, showing vertical heat exchanger pipes.

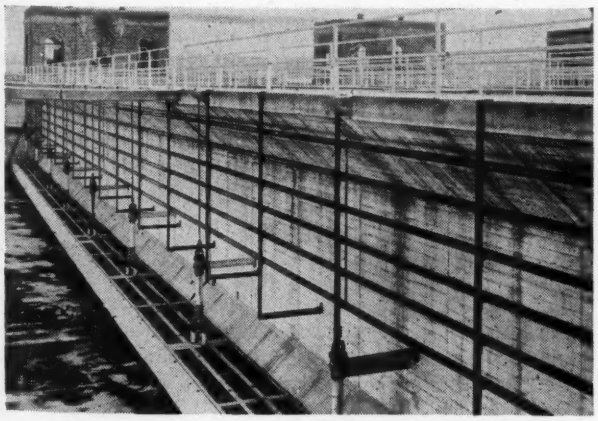
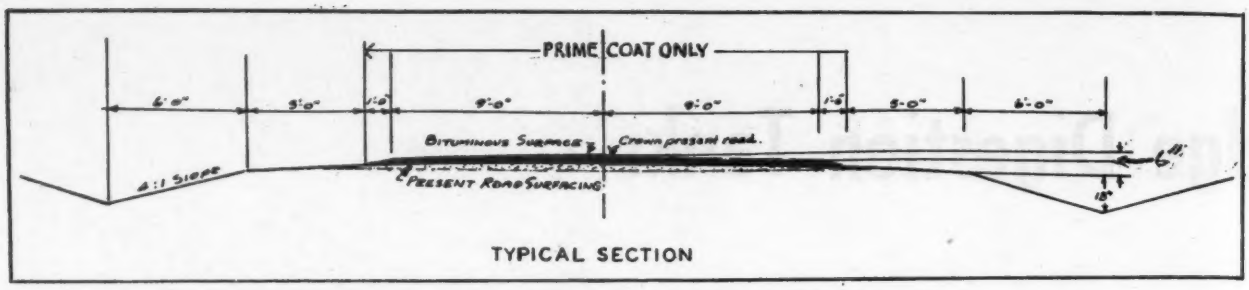


Fig. 5—3" w. i. coils suspended in aeration tank at Peoria, Ill.

Peoria, Illinois, has one of the outstanding sewage gas engine installations in the country, and the cooling water system is quite novel. Jacket water leaving the engines is first passed through waste heat boilers, where heat from the engine exhaust gases is reclaimed. It then flows to wrought iron heating coils in the digestion tanks. In the winter, it flows next through coils in the gas holders, and is returned to the building where the engines are located. If the temperature of the water is still excessive, it is diverted through 3" wrought iron cooling coils suspended in the aeration tanks. These coils are shown in Fig. 5. The power plant was designed and installed under the direction of John R. Longley, District Engineer of the Greater Peoria Sanitary and Sewage Disposal District. Greeley and Hansen, engineers, Chicago, were consultants on this project.



Typical section of the road whose construction is described in this article.

Bituminous Surfacing a Road in Wet Weather

Five miles of bituminous surface was constructed on a loose, sandy soil during a rainy, cold season, with satisfactory results.

By C. R. MELTON
Superintendent of Highways, Mason County, Ill.

WHERE State Highway No. 78, which is paved with portland cement concrete and runs N & S, crosses SA2 (which runs E & W) the latter also is paved with 6" concrete each way from the intersection for a total distance of 0.628 mi., this having been constructed by the county in 1925.

In 1937, 2.038 miles of SA2 immediately east of this concrete pavement was graded and graveled. The soil here was largely blow sand, and approximately 6" of clay loam was placed on the sand for a width of 20 ft. before the gravel was spread. In 1942 and 1943 additional gravel containing 5 to 10% of clay was added to maintain the surface in good condition. But this material had to be hauled 33 miles, which made the maintenance very expensive and some alternative was sought.

In 1940, 2.27 miles of SA2 immediately west of the concrete pavement referred to was graded and a surface of crushed stone 3" thick was constructed, the sand being first covered with earth for 0.3 mile of the most sandy part. By 1944 this section also needed resurfacing to carry the traffic.

Because of the excessive cost of maintaining these two sections and the poor condition of their surface, the county Board of Supervisors in June 1944 appropriated $17,000 for covering with bituminous surface, blotter type, the three sections of SA2 referred to, a continuous total length of 4.936 mi.

Along the 0.628 mi. of concrete pavement additional right of way was obtained so as to permit a minimum width of 60 feet throughout the entire 5 miles of the project, and the ditches and shoulders here were reconstructed to give a 30 ft. roadway, the concrete pavement being widened by placing gravel on the shoulders. Complete plans for the project were submitted to the Springfield District office on August 25th.

For about 20 days following this the County prosecuted the shaping and compacting of the surface, using a 1937 AC motor grader with a 12 ft. blade and a 1940 WC 10 ft. blade patrol, both owned by the county, and a rented wobble wheel pneumatic tired roller pulled by a 2-ton County truck. Very little rain fell during this period and it seemed doubtful whether the surface could be compacted sufficiently to attempt the bituminous treatment. Sprinkling was being planned but before it had started a rainy spell began, between 2 and 3 inches falling from Oct. 2 to Oct. 11. The surface then appeared to be satisfactory, but the air temperature meantime had dropped to around 50° and it seemed risky to begin the bituminous treatment.

On Sept. 22 we had contracted with the Illinois Road Builders to supply 27,130 gal. of MC-1 prime at 12 cts, 24,420 gal. of MC-3 treatment at 13½ cts and 1,221 tons of gravel blotter-type aggregate at $4.05. The bituminous materials came from the Wood River plant of the Standard Oil Co., and the aggregate from the McGrath Sand and Gravel Co. at Bloomington, Ill. The nearest unloading point was at Virginia, on State Highway No. 78 south of the job, the average haul being 15 miles.

The MC-1 prime arrived on Oct. 12 and was heated to 160°; and on Oct. 14th, with the air temperature at 66° to 74°, it was applied to the entire job, using two distributors and four supply trucks, at the rate of 0.5 gal. per sq. yd. This was distributed over a 20 ft. width except on the concrete pavement, where the width was 11 ft. Good penetration was obtained over the whole project except for a small part of the crushed rock surface which contained too much moisture. All traffic over the road was suspended for seven days, during which time 0.33 inch of rain fell but, with the 4-inch crown on the road, practically all of it ran off at once and any held in the small depressions evaporated before application of the surface treatment.

The MC-3 was used at 180° temperature and spread with an asphalt distributor in two applications of 0.25 gal. per sq. yd. each, in 9-ft. strips. Within 20 minutes after it had been spread the asphalt was covered with 20 lb. per sq. yd. of aggregate, of which 100% passed

(Continued on page 32)

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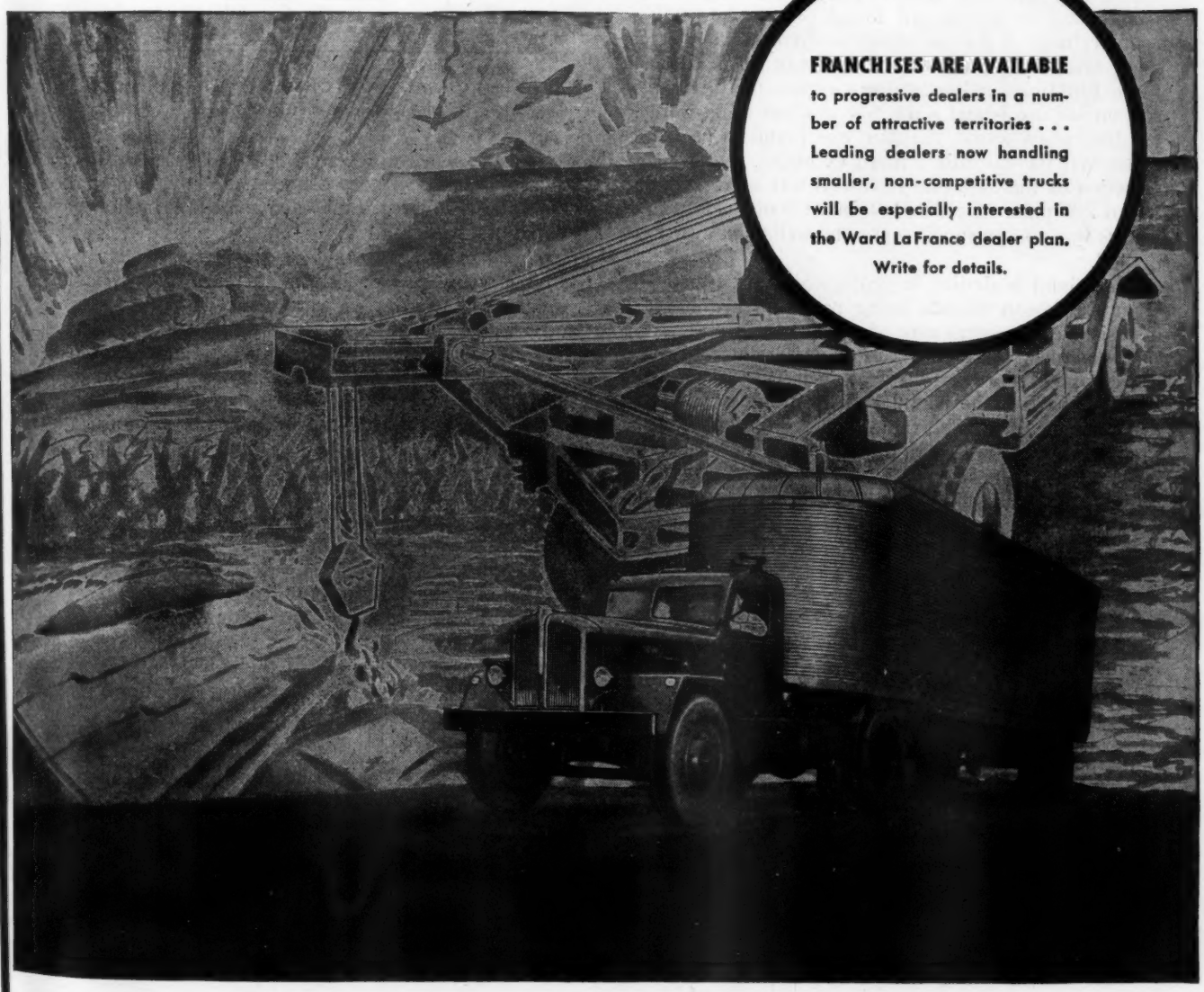

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Water Supply for a Caribbean Island Base

A water supply system developed for an island Army base where there were no natural bodies of surface water and where there had never been a development of the ground water. Over three years of operation have proven the adequacy and reliability of the system.

By D. C. SENGES, Capt., Sn. C., and K. E. TOWNSEND, Capt., C. E.

WHEN the United States Army started construction of a base on a British West Indies island a unique and complicated water supply problem was encountered. The island, though fairly densely populated, has no natural bodies of fresh water. There are no natural springs and the few small ponds found are brackish and often dry up. The native population for centuries has obtained the major portion of their water supply from drainage from roofs into cisterns. However, the per capita demand at an Army base far exceeds the per capita demand of the native population, therefore roof drainage alone could not be considered as the only source of supply. Larger buildings on the island such as hotels had found that in addition to roof drainage it was necessary to increase their catchment areas by paving relatively large areas adjacent to the buildings and collecting the run off. In the rural sections of the island some few shallow wells were in use but, when tested, the flow was found to be inadequate and the chloride content excessive. During construction of the base one such well was used although it had 700 ppm chlorides. Information on deep ground waters was non-existent because no wells had ever been drilled.

The island is similar in geological characteristics to other Caribbean islands being partly of sedimentary deposit over a central core of volcanic origin. The top soil is permeable and the run off is a relatively small percentage of the rainfall of 35 inches per year in the northern half of the island and 56 inches per year in the southern half. The arable land is planted to sugar cane which utilizes a high percentage of the water reaching the roots.

The absence of a source of surface water and the poor prospects of the development of a ground source led to the decision that fresh water consumption should be kept to a minimum. Sea water, of course, was available as was some brackish water from shallow wells. Later testing showed that brackish water was also available near the base from deep wells. Therefore, a dual distribution system was planned—fresh water for drinking and cooking, salt water for showers, the sewerage system and fire protection. After the base had been in operation for some time it was found that sufficient fresh water was available to change the showers from salt water to fresh water. Eventually four sources of fresh water and two of salt water were developed.

Following local precedent, the catchment area method of obtaining fresh water was first employed. The roofs of the buildings in the cantonment area were equipped with gutters which lead into an underground collection system. A total of 4.5 acres of roof surface

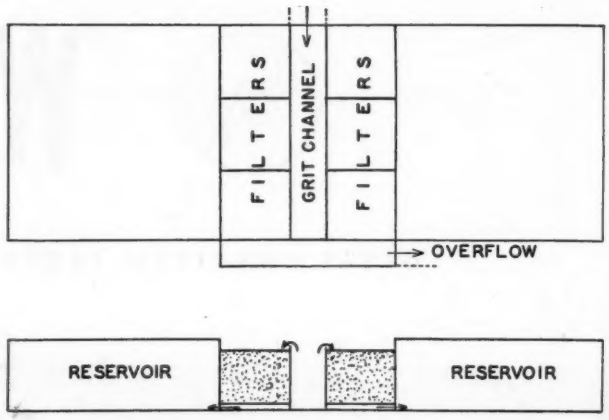


Fig. 1—Diagrammatic sketch of roughing filters.

were used. The rain water collected was allowed to flow by gravity without filtration to a 600,000 gallon reservoir. To increase the catchment area at the base, no paving work had to be done specifically for this purpose since the runways of the airfields nearby offered an excellent collecting surface. Approximately 40 acres of the runways were utilized for this purpose and a 2,000,000 gallon reservoir constructed. A novel roughing filter arrangement was devised to keep floating debris and the larger suspended particles from entering this reservoir. Figure 1 shows a diagrammatic sketch of these filters. No provision was made for adequately back-washing these filters and it has been found necessary to remove and wash the stone occasionally.

Although it would have been possible to increase the supply from the catchment system by including more catchment area and the construction of more reservoirs, the increased cost and possibility of a prolonged dry season indicated that an effort should be made to locate a source of ground water. Simultaneous with the planning and construction of the catchment area supply, the development of a ground water supply from deep wells was being investigated.

Permission was obtained to drill test holes along the public highways in the only area near the base that offered a potential source. This area was a shallow valley on the northern side of the island. The first well drilled entered a hard grey limestone aquifer 20 ft. below sea level. This limestone was the only aquifer found and extended to 50 ft. below sea level. The hole was continued to a total depth of 148 ft. or 70 ft. below sea level at which point a test pumping

(Continued on page 42)

SIMPLEX VENTURI TUBES

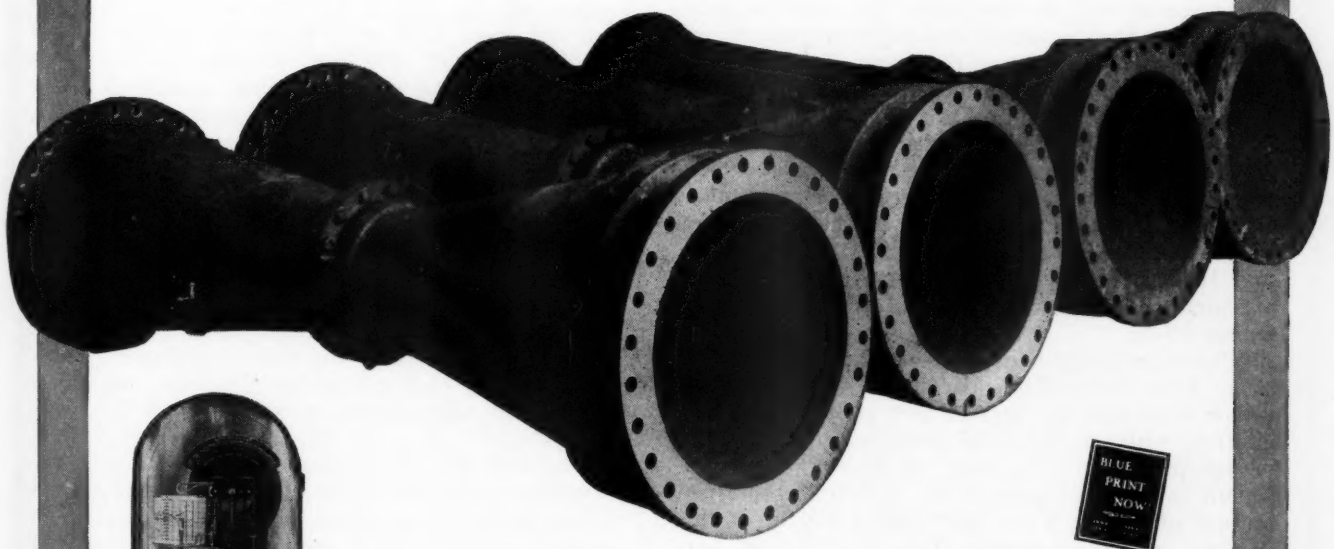
the ULTIMATE IN *Venturi Efficiency*

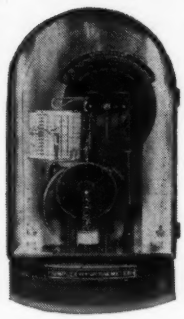
For a given flow of water, the Simplex Venturi and its Simplex Meter will measure with the least loss of energy, and the greatest accuracy over the widest range of flow!

The high constant efficiency with which the Simplex Venturi utilizes the differential head which it creates, has been proved by over 40 years of research and manufacture.

This highly-engineered primary device assures minimum head loss and normal, dependable coefficients. The unit is homologous in type and form; the tube throat is bronze-lined with extremely accurate piezometer taps; the pressure belt type design is essential to high and unvarying accuracy.

The venturi tube is accepted as being the most efficient of primary devices. . . . Installations as part of pipes and conduits of cast material and of fabricated structure, have proved the Simplex Venturi to be unsurpassed in installed operating efficiency!





THE MO METER COMPLETES THE PICTURE

The "MO" is the "Master" Meter that converts the differential head created by the Simplex Venturi into rates of flow and indicates, records, and totalizes that flow with the maximum overall accuracy. This combination of Simplex primary device and MO Meter provides a standard of operating efficiency for the flow measurement of water, sewage and process liquids ni many municipal and industrial plants. The MO Meter is of such high accuracy that it may be utilized for testing the accuracy of other metering equipment. Write for Bulletin 300 — "The Simplex MO Meter."

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When you need special information—consult the classified READER'S SERVICE DEPT., *pages 73-75*

Treating Metallurgical Wastes in Connecticut

Methods of treating chromium compounds, steel mill wastes and brass mill wastes, suggested by investigators of Wesleyan and Yale Universities.

CONNECTICUT contains hundreds of metal-working plants located in scores of communities which discharge their wastes into small streams or comparatively short rivers which provide a limited amount of oxidation and other forms of natural purification. Disposing of these wastes satisfactorily was one of the chief problems studied by the Hall Laboratory of Chemistry at Wesleyan University for the State Water Commission since 1928. So far more than 35 separate types of textile wastes have been investigated; the modern use of softening oils and emulsifying agents tends to complicate the treatment processes. Fermentation wastes and paper wastes are not so troublesome. Waste from de-inking of waste paper, which process uses silicates, is a recent problem, which has been solved by dilution and successive treatments with lime and alum, reducing the suspended solids by 96% and the oxygen-consuming power by 94%. Metallurgical wastes have been given some attention, but the chief investigation of these has been conducted by the Chemical Engineering Dept. of Yale University. However, the Hall Laboratory has investigated chromium compounds and reported as follows in November 1944:

"Chromium compounds have a relatively high polluting effect because of their intense and persistent yellow color, and also because they are toxic and thus interfere with the biological processes of stream and sewage purification. Recovery of the chromium compounds is of importance to the industries concerned because of the high cost and limited supply of this element and its compounds. This is, of course, particularly true in the war emergency. As a result of work done in this laboratory and the extensive cooperation of a large manufacturer in the State a plant has been installed for treating these wastes with barium sulfide as a combined reducing and precipitating agent and also with lime for the completion of neutralization and precipitation. The best recovery process appears to involve the use of sulfur dioxide as a reducing agent and soda ash for precipitation. The filtered precipitate is roasted to produce chromium trioxide in salable form."

The Yale University laboratory reported that, as between wastes from steel mills and brass mills, "The steel mill wastes are much the simpler of the two since they contain essentially only sulphuric acid and iron sulphate. The brass mill wastes, on the other hand, consist mainly of sulphuric acid and the sulphates of copper, zinc, sodium and chromium, but they may contain small amounts of tin, lead, cadmium, arsenic, antimony, nickel, iron, manganese, aluminum and a few other elements. Although these are present in very small amounts, they enormously complicate the problem of recovering products of market value from the wastes."

Steel Mill Wastes

Concerning these wastes, the report says, in part: "Treatment of the waste by dilution with large volumes of sea water, which is slightly alkaline and therefore capable of neutralizing the acid and precipitating the metal, is a simple scheme but one of limited applicability."

"Treatment with alkaline reagents is a well-known method but the cost of the reagent is an important item and there is a problem in the disposal of the sludge produced." The use of lump limestone was tried but involved many technical difficulties. Neutralizing the waste liquors with a solution of ammonia, thereby producing ammonium sulphate and iron oxide, is applicable to strong liquors but is not attractive economically.

The production of copperas from strong liquor has been practiced for some time at a number of plants but the potential production far exceeds the demand and in many cases it is sold for less than the cost of production. Evaporation, employed in the usual process, does not recover the acid. Considerable study has been made of a refrigeration process and others which would recover some of the acid as well as copperas.

"The difficulty of disposal of this product (copperas) led us to search for practicable means of converting it into two products which are in demand by the steel industry itself, namely, sulphuric acid and iron oxide. Technically this can be accomplished and is the method used at one large plant manufacturing titanium dioxide where there is produced a waste resembling pickle liquor from a steel mill. The difficulty with applying this process at any mill in this State is that the amount of copperas that could be produced is too small to make the process at all feasible economically. On the other hand, it does solve the pollution problem as far as the spent liquor is concerned and avoids the troublesome problem of sludge disposal. There is the further possibility that a simpler and cheaper method may be found for converting the sulphurous gases from the roasting of copperas directly into a weak sulphuric acid suitable for reuse in pickling, than the present contact process that produces a concentrated acid which is then diluted for use. This latter process is not suited for operation in small units but a process of catalytic oxidation in aqueous solution might be developed which would be feasible for this purpose. This is suggested as one direction in which further research on this problem might be pursued."

CHECK YOUR CORROSION TROUBLES here

WHICH OF THESE items of sewage treatment and waterworks equipment in your plant are sources of trouble and expense? Look over the list, check the offenders, and arrange to end your troubles . . . with non-rust Everdur*.

This widely used copper-silicon alloy provides years of trouble free service at low over-all cost. Its steel-like strength, high corrosion resistance, ready workability and weldability make possible tough, enduring equipment of lightweight construction.

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Information on *Everdur*

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E-5—Everdur Metal (Applications, Physical Properties and Constants).

E-6—Everdur Bolts, Screws and Accessories.

E-13—Everdur Metal Tanks and Equipment.

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Summary of Investigations on Brass Mill Wastes

"The guiding principle in all our work on these wastes has been to produce materials which could be utilized by the mill itself. Many processes were considered and the following, which seemed to offer the most promise, were investigated both experimentally and from an economic viewpoint.

"(1) A process of treating either dilute or strong liquors or a mixture of the two which involved the following main steps: Passage of the liquor through beds of scrap brass to reduce the hexavalent chromium to the trivalent form and to plate out the copper on the brass by an exchange with the zinc; precipitation of all metals from the effluent liquor by dosage with lime in controlled amount; settling of the precipitate to a sludge and filtration of the sludge; drying the sludge and roasting to oxidize the chromium to the chromate form; extraction of sodium chromate and concentration of the resulting solution to yield the chromate salt in a form suitable for reuse; solution of the residual impure zinc oxide in sulphuric acid; purification of the zinc sulphate solution and finally evaporation and crystallization of a pure crystalline zinc sulphate which could be marketed. Thus the process yields as products a high-copper scrap which can be remelted in the brass furnaces, sodium chromate which can be reused in pickling and zinc sulphate crystals which have a limited market. In place of the zinc salt, the process could be modified to yield by electrolysis metallic zinc and sulphuric acid both of which could be reutilized by the mill.

"Some of the steps in this process were tested in a pilot plant at one of the brass mills, the raw material being the wash water with which spent pickle liquor was mixed intermittently. About 1,500,000 gallons of the waste were treated in this plant and approximately 30,000 chemical analyses were made during its operation. Subsequent economic studies of six variants of this process on the basis of the data obtained indicated that a plant to treat 2,000,000 gallons collected over an 8-hour period but treated over a 16-hour period would cost from $100,000 to $200,000 depending on the particular process chosen. No one of the processes could operate with a net profit if all costs are included but a few of them could be expected to return products of sufficient value to pay all the direct operating costs. These particular studies were made on a rather dilute waste of highly variable composition due to intermittent discharge of the concentrated liquors into the same sewer that carried the wash water. Much of the plant cost was involved in the large storage basin required to equalize variations in composition. Subsequent studies made on more concentrated wash waters and from plants where the two classes of wastes can be kept separate show more favorable economics. The following two processes are based on the assumption of separate preliminary treatment of the two wastes and cost estimates assume a more concentrated wash water than was assumed in the case of process No. 1.

"(2) A process for the regeneration of spent chromate pickling liquor or the treatment of wash water concentrate or a combination of the two for a complete treatment of both the dilute and concentrated wastes.

"If wash waters are to be treated by this process, they must first be concentrated and this may be done by precipitation with lime, following by settling, thickening and filtration. To recover all the chromium of the dilute waste, that portion which appears as chromate must be reduced to the trivalent form and one method of accomplishing this is by passage over brass scrap prior to the precipitation. Since most of the chromium will have been reduced in the pickling operation, it may be more economical to omit this step and not attempt to recover the chromium still present in the chromate form. The filter cake produced contains substantially all the metals originally present in the wash water and is referred to as 'wash water concentrate.' This concentrate is dissolved in sulphuric acid and the resulting solution mixed with any spent pickling liquors for subsequent treatment to recover by-products. The steps in this subsequent processing are as follows: Sand filtration, reaction with brass scrap to reduce chromium and plate out the copper, treatment with zinc dust to remove most of the other metals from solution and finally electrolysis of the solution in a diaphragm to produce metallic zinc and a regenerated chromic acid-sulphuric acid solution. . . . The process appears to be entirely feasible from a technical standpoint.

"The best solution to the brass pickling waste problem appears to be to separate the two classes of waste, concentrate the dilute waste by precipitation with lime followed by settling and filtration; then treat this concentrate combined with the strong, spent pickle liquor by either of two processes described above. These processes yield only products which can be directly reused by the mills. The processes require further development but they offer promise of recovering values sufficient to pay the entire treatment cost provided the wash waters are not too dilute.

"If the two wastes cannot be separated, the recommended scheme is to treat the mixture to concentrate the metals just as in the case of wash water previously discussed and then process the precipitated metal oxides to recover useful products by one of the two methods already presented. Such a treatment scheme produces a harmless effluent but the return on products recovered will only pay a portion of the cost of treatment."

Bituminous Surfacing a Road in Wet Weather

(Continued from page 26)

the ⅜ sieve, 42% the No. 4, and 0 to 5% the No. 10. The aggregate was spread with a Buckeye spreader and 7 dump trucks, which backed over the oiled surface so the wheels would not pick up the oil. Then a 1½-ton dump truck pulling a wire drag 9 ft. wide and 18 ft. long (made of old guard rail mesh) leveled off the aggregate and covered any spots missed by the mechanical spreader. The surface was then rolled twice with the wobble wheel roller, drawn by a 3-ton International truck carrying about 2 tons of ballast.

This MC-3 treatment required four 9-hour days for the two applications. The air temperature ranged from 58° to 74° and no rain fell during the period. Traffic was permitted over the road as soon as the work had been completed.

The total cost of the shaping, rolling the surface and reshaping the ditches and shoulders and clearing the right of way was $13,497.35, or $2,734.30 a mile. The project was especially interesting because it was done at a very late date for this part of the country and with rain occurring just as we wanted to complete the work. At the time this article was written (April 26th) the surface appeared to be satisfactory and will need very little work on it this year.

Fairbanks-Morse

Complete Pump Units Serve San Diego

. . . in New Sewage Disposal Plant

SAN DIEGO, CALIFORNIA, has placed the undivided *responsibility* for its sewage pumping problem on Fairbanks-Morse Pumps. Photo shows the battery of seven sewage pumps—1,000 to 10,000 g.p.m. —which will handle 46 million gallons per day in the new plant. Fairbanks-Morse Vertical Shaft Motors drive these pumps from the floor above. To date the plant is handling up to 26 million gallons a day at a cost of less than $15 per million.

Another city has discovered the advantages of installing Fairbanks-Morse Pumps.

For Fairbanks-Morse Pumps—complete with pump, driver, and base—offer these three vitally important advantages in addition to lasting efficiency:

Combined Responsibility—Designed and built in one factory, pump and driver (motor or engine) are perfectly matched and covered by a single guarantee.

Successful UNIT Performance—Tested in one plant under expert engineering supervision, pumps and drivers assure a superior result to the buyer.

Service from One Source—One engineer is familiar with entire installation—no question of who makes adjustments or required repairs.

To benefit from this undivided responsibility, consult a Fairbanks-Morse engineer. There is no obligation. Write Fairbanks, Morse & Co., Fairbanks-Morse Building, Chicago 5, Illinois.

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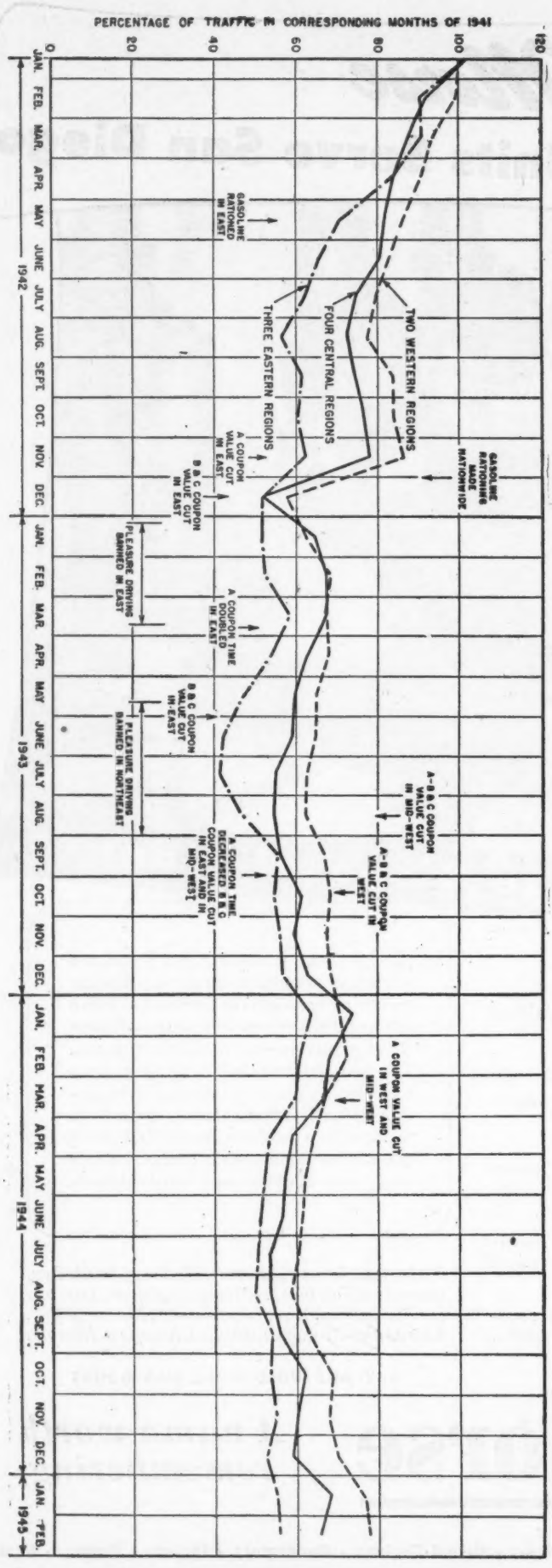
PERCENTAGE OF TRAFFIC IN CORRESPONDING MONTHS OF 1941
0
20
40
60
80
100
120
JAN. FEB. MAR. APR. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC.
1942
JAN. FEB. MAR. APR. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC.
1943
JAN. FEB. MAR. APR. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC.
1944
JAN. FEB.
1945
GASOLINE RATIONED IN EAST
THREE EASTERN REGIONS
FOUR CENTRAL REGIONS
TWO WESTERN REGIONS
GASOLINE RATIONING MADE NATIONWIDE
A COUPON VALUE CUT IN EAST
B.B.C. COUPON VALUE CUT IN EAST
PLEASURE DRIVING BANNED IN EAST
A COUPON TIME DOUBLED IN EAST
B.B.C. COUPON VALUE CUT IN EAST
PLEASURE DRIVING BANNED IN NORTHEAST
A COUPON TIME DECREASED B.B.C. COUPON VALUE CUT IN EAST AND IN MID-WEST
A-B.B.C. COUPON VALUE CUT IN MID-WEST
A-B.B.C. COUPON VALUE CUT IN WEST
A COUPON VALUE CUT IN WEST AND MID-WEST

Curves for eastern, central and western regions of the country, showing the average volumes of highway traffic since 1941, and incidents which affected it.

Highway Traffic During the War

Changes in traffic during the past five years, as indicated by 638 traffic recorders.

Figures have been published by the Public Roads Administration showing, by monthly averages, the volumes of traffic on the country's highways since 1941, compared with those during the corresponding months of that year; which data have been plotted in the accompanying diagram. In this, the country is divided into three sections: The three eastern regions—New England, Middle Atlantic and South Atlantic; the four central regions—East North Central, West North Central, East South Central and West South Central; and the two western regions—Mountain and Pacific. The data are brought up to February of this year.

It is seen that July and August have been the months of minimum traffic each year, while the maximum has occurred during one of the first three months. The notations on the diagram indicate the effect on traffic of variations in value of gas coupons and ban on pleasure driving. Especially noticeable is the effect of extending gasoline rationing from the east to the middle and far west in December 1942.

Comparing traffic in February 1945 with February 1941, and classifying it by type of vehicle, we find, in the three eastern regions, a decrease of 34.9% in passenger cars and an increase of 3.7% in trucks and buses. In the four central regions there was a decrease of 18.2% in passenger cars and of 7.6% in trucks and buses. In the two western regions there was a decrease of 0.6% in passenger cars and an increase of 73.7% in trucks and buses.

Comparing February 1945 with February 1944, we find a decrease for both classes of vehicles in both the eastern and central regions, but a slight increase in the western states.

The above data are based on the records of 638 automatic traffic recorders distributed through all the states except Louisiana, Minnesota and New Jersey.

Status of Truckers in Subcontract Work

The main question in determining whether the driver of a truck on road construction work is an independent contractor is whether or not he has contracted to do the work according to his own methods and without being subject to the control of his employer except as to the result of his work. Cartmen, draymen and truckmen are generally recognized as independent contractors where they haul for a unit price with no supervision as to the manner or method of hauling. In case of a conflict in the evidence, the question is for the jury.

A ballast company contracted with a highway commission to furnish crushed stone at a stipulated price per ton. It sublet a part of the contract to another, which was to receive, unload and spread the stone for 50 cents per ton. The latter sublet the subcontract to another at 40 cents per ton. The Kentucky Court of Appeals held (275 Ky. 677, 122 S. W. 2d 501) that the last mentioned was an independent contractor and the subcontractor was not liable for the death of a third person caused by the negligence of a trucker hired by the second sublessee. It was immaterial whether the latter, who hired and paid his own employees, was to haul all or only part of the stone for the project.

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☆ The complete Cleveland line includes the *right* model for *every* job—whether it's paving breaking, demolition work, frost breaking, ripping up foundations or masonry, breaking shale and hard ground, etc. Make your choice from: (1) The 80 lb. C7, best for average work; two run from a No. 85 compressor. (2) The 82 lb. C7, a slugger for the hardest work; two run from a No. 85 compressor. (3) The 35 lb. C10, a smaller tool for lighter work; three run from a No. 85 compressor. (4) The 58 lb. C11, with long stroke and heavy, slugging blow. Two run from a No. 85 compressor. All these Cleveland models have *always* been air cushioned.

To help you further there are "Cleveloy" *armor-plated* chisels, moils and tools; durable "Veribest" air hose and Cleveland quick-acting hose couplings.

Write for Bulletin 128 on Cleveland Paving Breakers

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Have You a Complete Sewerage System?

A check list believed to contain practically every major item found in complete modern systems. Probably no system, large or small, can check every item listed.

PROBABLY few engineers who are responsible for the collection and disposal of the sewage of their cities can sit back with a satisfied smile and claim that no improvements could be made to their sewerage system. If there be any such, we suggest that they look over the appended check list. We doubt whether any will be justified in continuing to have that contented feeling. We hope not, for discontent is the mother of progress.

But that progress, in this case, means expenditure of public funds; and getting those funds involves convincing the city administrators that the improvements are necessary or at least very desirable. This check list was prepared by the Committee on Water and Sewage Works Development to help city engineers and sewage works superintendents in presenting their requests for such funds, and to remind them of needs that may have been overlooked.

A. Sewer System—General:
1. Are the sanitary sewers separate from the storm sewers?
2. Is the capacity ample to prevent overflows during storm periods?
3. Are industrial wastes admitted to system without preliminary treatment by industry?
4. Are periodic charges for service rendered made to each contributor of sewage?
5. Is infiltration reducing system capacity?
6. Has there been any "failure" due to chemical reaction in sewers?
7. Do you collect all the outfalls into one intercepter?

B. Separate Sanitary Sewers:
1. Has roof drainage been excluded from the sewers?
2. Are there "unsewered" areas in your city?
3. Are the manholes adequately spaced for proper cleaning operations?
4. Do manholes need:
   (a) replacement of war substitute covers?
   (b) new manhole steps?
   (c) reconstruction of failed mortar joints?
5. Are "sewage gas" odors noticeable near manholes?
6. Is there a need for chlorination or other chemical treatment in the system?

C. Combined Sewerage System:
1. Will cleaning increase carrying capacity?
2. Are additional catch basins needed?
3. Have the sewers been checked for erosion—both physical and chemical?
4. Are "sewer gas" odors obnoxious in dry periods?
5. Are the sewers utilized for:
   (a) snow removal?
   (b) ground garbage disposal?

D. Sewage Pumping (Lift) Stations:
1. Are stations fully automatic as to operation?
2. Are the pumps properly protected?
3. Are the pumps of proper capacity for efficient, economical operation?
4. Are the operators protected against gas hazard by positive ventilation?
5. Is explosion-proof equipment used?
6. In the event of power failure, is there a by-pass available?
7. Can the station be by-passed for rehabilitation?
8. Are you using sewage gas engines as a power unit?

E. Sewage Treatment Works:
1. Have you devices for measuring:
   (a) plant influent?
   (b) plant effluent?
2. Have you a by-pass of proper size so that the entire plant may be shut off?
3. Grit Removal and Disposal:
   (a) Are increased channels needed?
   (b) Are repairs necessary to mechanical removal devices?
   (c) Do you wash the grit before disposal?
4. Screenings:
   (a) Are the coarse bar screens in need of repair?
   (b) Are the mechanical cleaning devices satisfactory?
   (c) Are the screenings ground through adequate grinders?
   (d) Is disposal troublesome from a manpower standpoint?
5 Pre-sedimenation Processes:
   (a) Are flocculation devices utilized?
   (b) Is chemical precipitation used?
   (c) Is grease collection and disposal satisfactory?
6. Sedimentation:
   (a) Is the detention period sufficient at all times?
   (b) Will improved baffling give better results?
   (c) If so, do mechanical collecting devices need repair?
   (d) Are there ample interconnections and valves for proper operation?
   (e) Is there need for betterment in scum disposal?
7. Sludge Pumping:
   (a) Are pumps in need of repairs or replacement?
   (b) Are pump pits properly ventilated?
   (c) Are sludge pump discharge lines clean?
   (d) Are there ample interconnections and valves for proper operation?
8. Secondary Treatment:
   (a) Is additional capacity needed?
   (b) Would recirculation improve efficiency in filters?
   (c) Do filters need cleaning?
   (d) Are filter flies a serious problem?
   (e) Are mechanical blowers, distributors, etc., in proper operating condition?
   (f) Do air distributors need cleaning?
   (g) Would sludge concentration be of value in operating the plant?
9. Chlorination:
   (a) Has your equipment an adequate operating range or capacity?
   (b) Have you proper protection devices against accidental breaks in chlorine containers or pipe lines?
   (c) Haye you a control system for chlorine dosage?
   (d) Have you any need of additional chlorinators for:
      (1) standby service?
      (2) treatment of ponded trickling filters?
      (3) treatment of clogged porous plates, etc.?
      (4) treatment of returned activated sludge?
      (5) prevention of digester foaming?
      (6) odor control?
10. Solids Disposal:
   (a) Have you sufficient:
      (1) digester capacity?
      (2) vacuum filters?
      (3) elutriation?
      (4) sludge drying beds?
      (5) sludge incinerators?
      (6) glass covered drying beds?
      (7) fertilizer manufacturing equipment?
   (b) Are you recovering and using sludge gas for:
      (1) boilers (digester temperature control)?
      (2) heating of structures?
      (3) power in gas engines?
      (4) grease and skimming incineration?
   (c) Have you any method of measuring sludge going to and from digesters?

(Continued on page 44)

You Know About

of war construction requirements. *They do not require reconversion.*

Put your trust in pipe you know about—cast iron pipe with its history of long life and low maintenance cost. We might also say, with good reason, the pipe almost *everybody* knows about, since it has been advertised to the public for 20 years.

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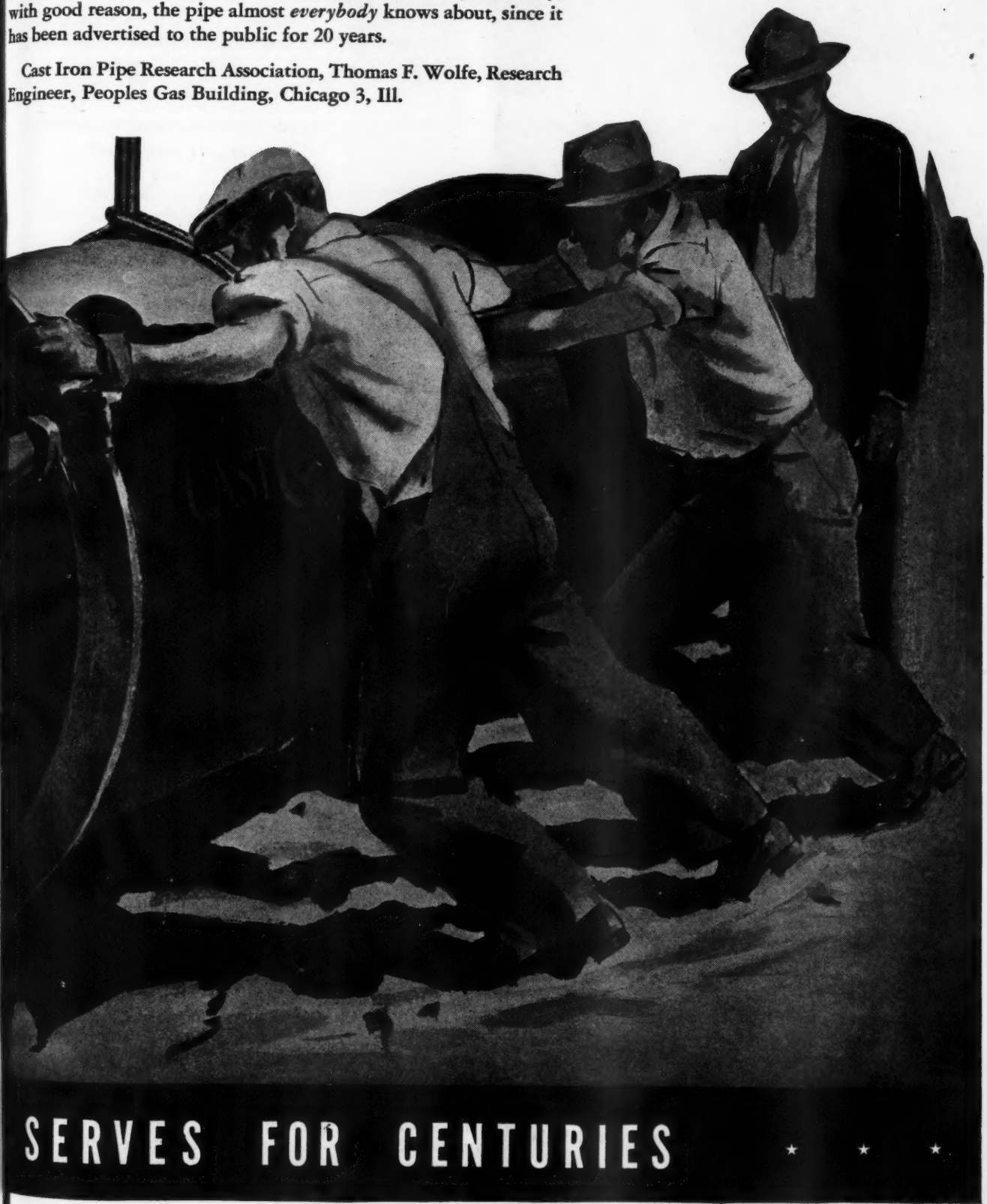
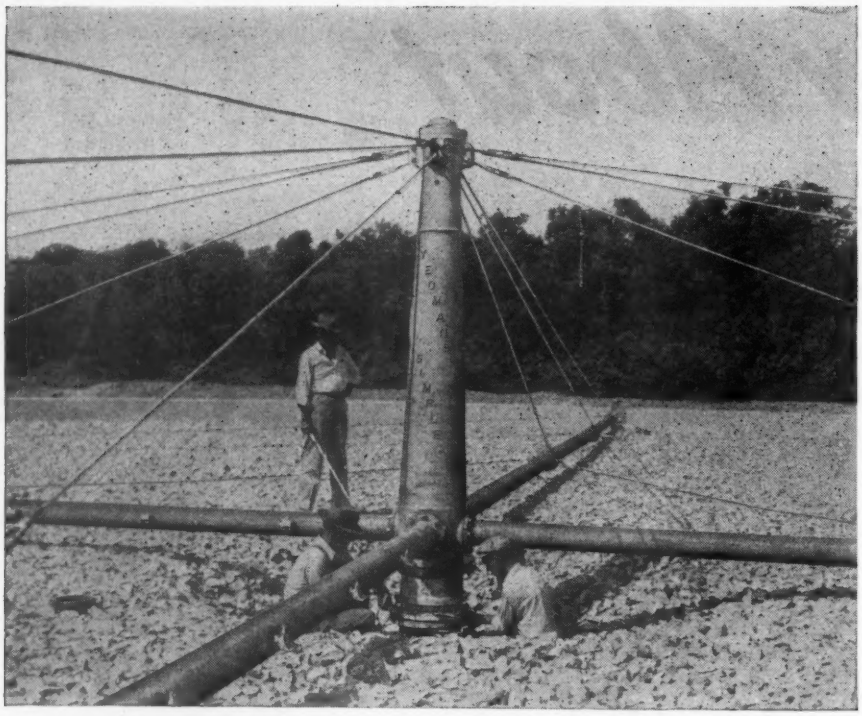


SERVES FOR CENTURIES ★ ★ ★

When you need special information—consult the classified READER'S SERVICE DEPT., *pages 71-73*



Yeomans distributor at Tullahoma, Tenn. Engineers are shown plumbing the column by means of the "Leveler." Population about 15,000.

Recent Sewage Treatment Plant Designs

(Continued from page 17)

Comminutors were installed in 11 plants.

Grinders or shredders in 2 plants.

Grit Chambers. These were included in 5 plants, one with and 4 without continuous removal mechanism.

Settling Tanks. Mechanically equipped tanks were provided in 24 plants; not specified in the case of one plant.

Imhoff tanks were included in 2 plants.

Chemical Treatment. Chemicals were used at one plant. Flocculation tanks with mechanical agitation were provided at 3 plants.

Filters. One plant included an intermittent sand filter.

Rotary distributors were used on the trickling filters of 6 plants and fixed nozzles at one plant. Not specified for 3 other trickling filter plants.

High-rate filters were provided at 6 plants, 3 single-stage and 3 two-stage.

Land Application is practiced at 2 plants, one with cropping.

Activated Sludge treatment was included in 3 plants, all with diffused air aeration.

Chlorination. Use of chlorine gas was provided for at 21 plants. None used hypochlorite.

Digestion Tanks. Of the 18 plants where separate sludge digestion tanks were provided, 4 had fixed covers, 7 had floating covers. Gas was used for heating at 12, for engines with heat as a by-product at one. Gas storage was provided at 3 plants. Two had stirring or concentrating mechanism.

Four employed two-stage digestion.

Sludge Storage tanks were provided at two plants, open at one, with fixed cover in the other.

Sludge Beds. Four of the plants had covered beds, 18 had open ones.

Sludge Dewatering mechanically was provided at two plants. One used a sludge lagoon.

Design Populations of Over 25,000

Ten plants come under this classification:

California—Salinas, San Bernardino, San Diego.

Connecticut—Stamford.
Indiana—East Chicago.
Michigan—Battle Creek.
Missouri—Hannibal.
New York—Cheektowaga, Jamaica.
S. Dakota—Sioux Falls.

Screens. Fine screens were installed at one plant.

Mechanically cleaned bar screens were installed at 4 plants and hand-cleaned at 7 (two plants had both types).

Comminutors were installed at 4 plants.

Grit Chambers. Six plants contained grit chambers, all with continuous removal mechanism.

Skimming Tanks. One plant included these, using aeration and mechanical equipment.

Settling Tanks were constructed at all 10 plants, all provided with mechanical equipment.

Flocculation. Three plants provided flocculation, 2 by mechanical agitation and one by air.

Filters. Trickling filters were provided at 4 plants, two of them high-rate single-stage, one high-rate two-stage.

Activated Sludge. Three plants provided activated sludge treatment, using diffused air aeration. One used plain aeration without sludge return.

Chlorination. Use of chlorine gas was provided for at 8 plants.

Digestion Tanks were included in all 10 of these plants, 3 of them two-stage. Four have stirring or concentrating mechanism. Three have floating covers, 2 fixed covers, one is open. Gas is used for heating at 7 plants and in gas engines at 2; 4 plants providing gas storage in digester or separate holder; and one has a gasometer cover.

Sludge Beds. One plant provided covered beds; 3 plants, open ones.

Sludge Dewatering mechanically was provided for 9 plants.

Sludge Lagoons were used at 3 plants.

Sludge Thickeners were provided at 2 plants.

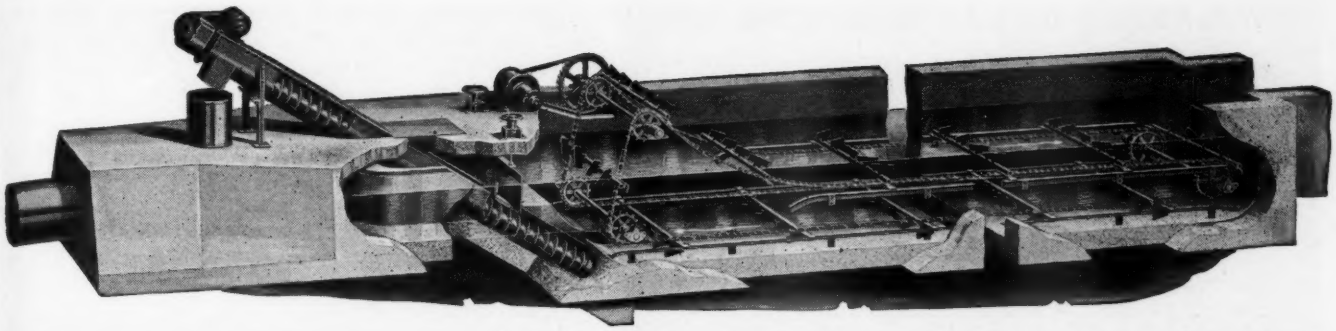
Elutriation was provided at one plant.

Sludge Incinerators were included in 4 plants, 2 of the flash drying type, one circular multiple-hearth, the fourth not designated.

One fact that these data make prominent is the extent to which designers include, in small plants, mechanical equipment and construction of up-to-date developments, which involve expenditures that would have raised a howl of protest from the taxpayers a few years ago. And this was a war year, with the inhibitions and delays in obtaining all kinds of mechanism caused by priorities.

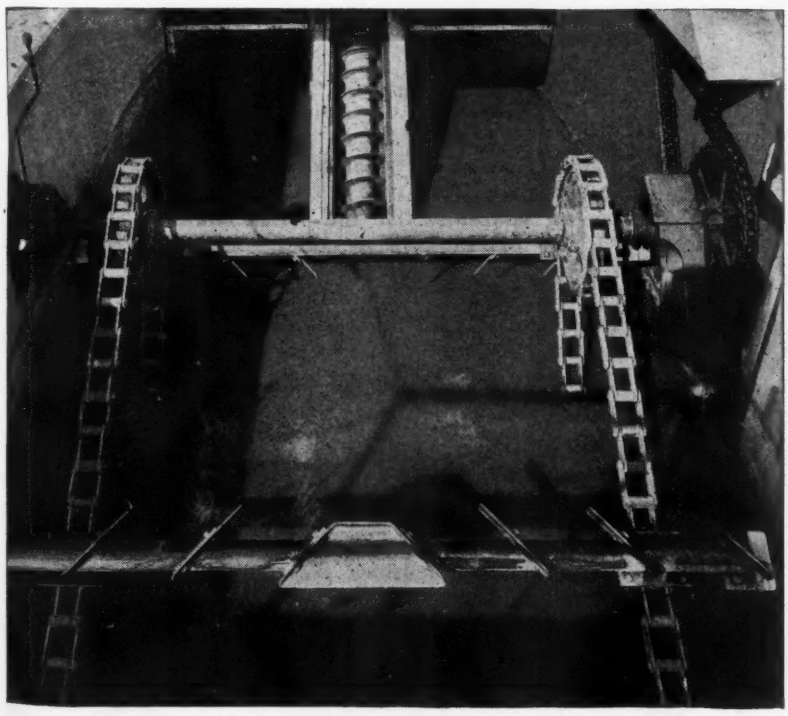
Of the 26 small plants (for only 100 to 1000 persons), 9 included trickling filters, two of these being high-rate. Seven provided mechanical sludge removing equipment in the settling tanks. One plant included

(Continued on page 44)



THE STRAIGHTLINE GRIT COLLECTOR & WASHER

Washes as it Separates.... As it Removes Grit from Settling Chambers



Head end of collector mechanism where delivery is made to inclined screw conveyor-washer.

● The STRAIGHTLINE Grit Collector and Washer consists of a conveyor with pitched flights which turns the material over and over, discharging it into a washing and dewatering screw at the influent end of the tank. It combines these functions:

Collects the settled grit and keeps most of the organic matter in suspension so that it will float out of the chamber. The action and speed of the collector assure this.

It separates the heavy organic matter from the settled grit, discharging the grit above the water line of the chamber with a minimum of organic material and moisture. Send for Folder No. 1942.

For medium and small size plants, the Link-Belt Tritor is ideally suited. It combines the functions of a mechanically cleaned bar screen and grit chamber. Send for Booklet No. 1587.

LINK-BELT COMPANY

Philadelphia 40, Chicago 9, Cleveland 13, Indianapolis 6, Los Angeles 33, Toronto 8.

Offices in principal cities

9452

LINK-BELT

SCREENS · COLLECTORS · AERATORS · GRIT CHAMBERS · MIXERS

Water Supply for a Caribbean Island Base

(Continued from page 28)

showed that the well would deliver 25 gpm with a drawdown of 15 ft. from a static level at 19.1 ft. elevation. Numerous other wells were then drilled so that the total flow would equal the fresh water demand. Several wells that did not penetrate the limestone were dry or furnished too little water. Furthermore, the static levels of wells of this type were below sea level. Since high chloride content had been a characteristic of the shallow dug wells it is interesting to note that after pumping, the chlorides of the well waters have fallen from 210 ppm on Well No. 1, when first tested, to 71 ppm. Experience to date has been that when the wells are pumped for a month at a time during the dry season, the static level remains fairly constant; however, the chlorides will rise slowly to as high as 300 ppm.

Since there was no precedent for drilled wells on the island and consequently no experience or data concerning the continuity or salinity of the underground flow, a sea water distillation plant was installed. This plant consists of a series of standard-design stills using sea water for feed water and cooling water. To date, this plant has been used for only about one month during an unusually dry period.

The salt water system was originally supplied from a deep well drilled near the base that furnished water with a chloride content of 800 ppm. In addition, a sea water pumping station was constructed on an artificial inlet protected by a stone seawall. Vertical turbine pumps were installed in a building over the inlet. The clarity of the sea water was such that it was not necessary to filter this supply. Later, the well was abandoned and sea water used exclusively in the salt water system. Concrete reservoirs and cement-lined pipe are used in the salt water system, which has resulted in a minimum of maintenance.

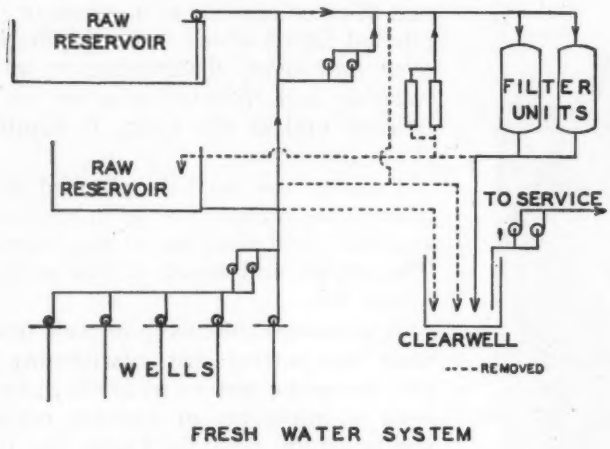


Fig. 2—Flow diagram of treatment plant.

The treatment plant, Figure 2, consists of the major parts of two Army mobile water purification units installed on a permanent basis. All water from the wells and from both catchment areas passes through the plant. The flow diagram indicates many cross connections installed originally for flexibility of operation but since removed. Only one source is used at a time, each source having an independent low lift pumping station. Table I shows a tabulation of the bacteriological examinations made in 1944 and part of 1945.

Table I

Results of bacteriological examinations made according to Standard Methods and tabulated in accordance with U. S. Public Health Service standards.

Type of Sample	*Raw, Wells*	*Raw, Catchment*	*Treated Mixed*
No. of samples	29	8	39
No. of non-potable	14	7	0
% non-potable	48.3%	87.5%	0
No. of portions positive	76	35	0
% of portions positive	52.4%	87.5%	0

Raw water from the wells as well as from the catchment areas has a high degree of contamination. The treatment, which consists of the addition of ammonium alum, filtration, and chlorination has produced a satisfactory water. The alum dosage used has added more ammonium radical than necessary to form chloramines; however, a clearwell following the filters allows sufficient retention time for sterilization.

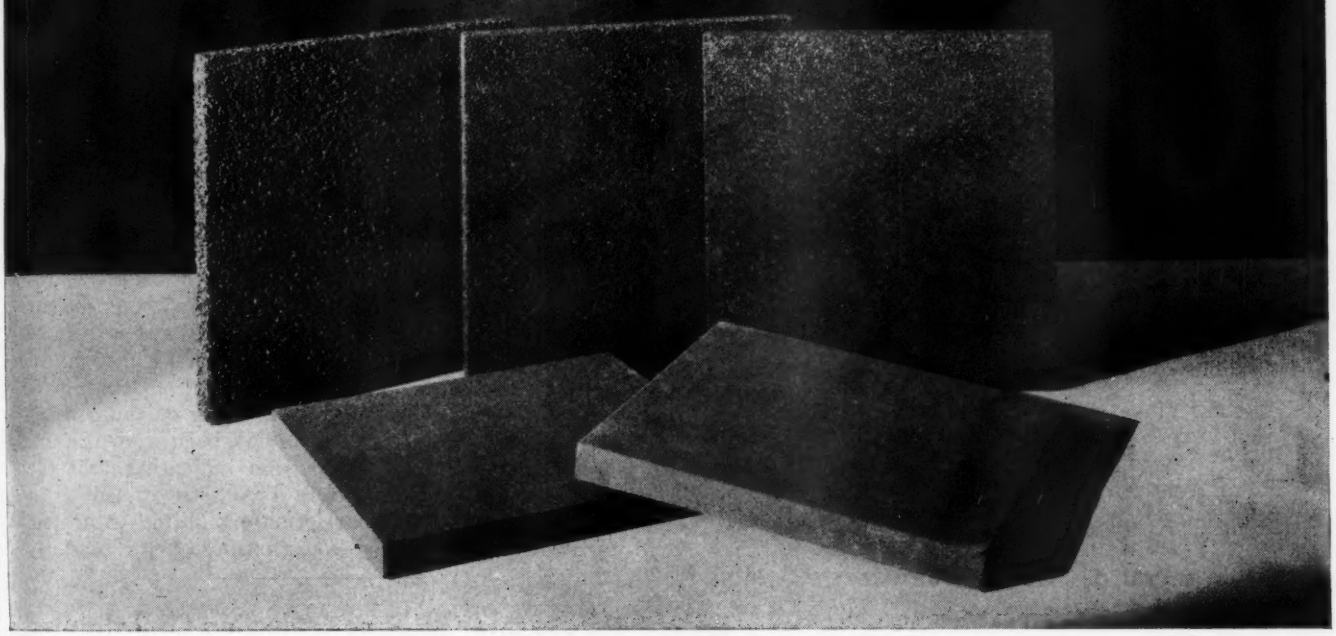
As might be expected, the chemical quality of the water from the catchment areas is very good. The two catchment waters are mixed in the cantonment catchment reservoir so that the pH of the mixed water is between pH values shown on Table II. The wells produce a water high in total solids, comparatively low in chlorides and high in alkalinity. The well water tends to precipitate calcium carbonate readily on heating, which has led to the use of catchment water as much as possible. When using well water alone, sodium metaphosphate has been added at the filter plant to prevent carbonate deposition in cooling equipment.

Table II

Chemical analyses of deep well and artificial catchment waters. Analyses made according to Standard Methods

		Chemical Water Analyses					
Source		*Well*	*Well*	*Well*	*Well*	*Catchment*	*Catchment*
Total solids	ppm	1034	1162	1220	920	176	207
Color		6	12	26	1	16	22
Odor		None	None	Soapy	None	None	Earthy
Turbidity		4	10	100	4	3	10
Hardness	ppm as $CaCO_3$	191	254	219	190	53	51
Alkalinity MeO	ppm as $CaCO_3$	530	510	570	500	47	58
Alkalinity Phn	ppm as $CaCO_3$	0	0	0	0	0	4
pH		7.6	7.4	7.7	7.6	7.0	8.4
Calcium	ppm as Ca	40.3	65.5	54.9	43.2	3.7	3.4
Magnesium	ppm as Mg	22.0	22.1	19.8	20.0	10.6	10.6
Iron	ppm as Fe	0.5	0.4	0.5	0.0	0.1	0.05
Sodium and Potassium	ppm as Na	—	—	—	—	27	43
Carbonate	ppm as CO_3	0	0	0	0	0	4.8
Bicarbonate	ppm as HCO_3	647	634	696	610	57	61.
Sulfate	ppm as SO_4	82	116	102	45	46	22
Chloride	ppm as Cl	71	90	88	57	28	28
Nitrate	ppm as NO_3	17.6	19.9	17.6	17.6	0.4	0.4
Aluminum	ppm as Al	—	—	—	—	0.13	0.73

NORTON POROUS PLATES
For Rapid Sand Filtering



Norton Porous Plates

are specified for many rapid sand filtering plants because they are engineered for long life and trouble-free service. From Norton Research Laboratories have come porous plates that are ruggedly designed, chemically stable, and uniform. Made in a variety of shapes, sizes and porosities, Norton Porous Mediums successfully meet divergent conditions in many types of industrial filtration and aeration.

NORTON COMPANY • WORCESTER 6, MASS.

Norton Longer Lasting Porous Mediums

When you need special information—consult the classified READER'S SERVICE DEPT., *pages 71-73*

The success of this treatment cannot be judged in this instance since the feeding equipment was inadequate and because of the short periods of low rainfall during which the well water was used. In general, the use of catchment water is preferable.

Recent Sewage Treatment Plant Designs

(Continued from page 40)

activated sludge treatment, one had a comminutor and one mechanically cleaned screens.

The next class is really the typical one—from 1,000 to 5,000 population. It includes practically half of all the plants built that year. Thirty percent of them included comminutors. Over 40% included Imhoff tanks, and nearly 60% of the plain settling tanks were provided with mechanical sludge-handling equipment. Trickling filters were included in 52% of the plants, 7 of them high-rate. Sixteen percent of them were activated sludge plants. Nearly half the plants provided separate sludge digestion, and gas from this was used for heating in more than half of them.

In the next class, 5,000 to 25,000, we find comminutors in 40% of the plants; also a few shredders, grit removal mechanism, and flocculation mechanisms. All but two of the plants included mechanically equipped settling tanks. Six plants installed high-rate filters. Digestion gas was used in half the plants, 3 having gas storage tanks.

All of the plants for over 25,000 population included settling tanks with mechanical equipment and digestion tanks. Sixty percent had grit chambers with removal mechanism; 90% provided mechanical sludge dewatering, and 40% sludge incinerators.

Have You a Complete Sewerage System?

(Continued from page 36)

(d) Are you using lagoons for disposal?
(e) Are you disposing of dried sludge by:
  (1) grinding?
  (2) sale to public?
  (3) stock piling?
(f) Can you recirculate the sludge and supernatant in your digesters?
(g) Have you satisfactorily solved the supernatant problem?
(h) Is scum handling a problem?

11. General Plant and Operation:
(a) Are full precautions as to safety of operators taken by protective fences, walks, explosion-proof equipment, etc.?
(b) Are you utilizing adequate laboratory control over the plant processes?
(c) Have you a cost account system for the plant?
(d) Does the plant need a new climb-proof fence?
(e) Have the grounds been properly graded and planted to grass, flowers, shrubbery, etc.?
(f) Are flood lights available for night operation?
(g) Is the plant accessible by a good road?

Some Trenching Suggestions

In a communication in the *Journal* of the American Water Works Association, W. Victor Weir, superintendent of St. Louis County Water Co., Missouri, tells of some practices employed by that company that may give valuable suggestions to other superintendents.

Digging and backfilling trenches and installing pipes are paid for at piece rates rather than hourly wages. This has increased the man-hour output 50 to 100%. The rates are set to enable the men to earn 25 to 50% more than the regular hourly rate of pay, but they also lower the cost to the company materially.

Excavations made in repairing leaks have to be backfilled with the mud removed and guarded until the water soaks away, or be backfilled with dry earth from elsewhere and the mud hauled away. If portland cement is thoroughly mixed with the wet earth, one or two bags for an ordinary leak excavation, the backfill will support traffic as soon as the cement sets. The cost of the cement is much less than that of manpower to obtain dry dirt or to protect the excavation from traffic for several days.

Construction of Curves in Highways

Affirming judgments for the State in claims for damages resulting from an automobile accident at a curve in a village, the New York Appellate Division held (Ruggiero v. State, 10 N. Y. S. 242) that the sole cause of the accident was the driver's failure to heed the ample warnings given by five signs located east of the curve. The court said that while it may readily be conceded that the standards of safe construction of highways are gradually being raised, curves are still necessary and as to them the principal duty resting upon the state is to give adequate warning. The mere construction of a curve without a clear sight distance around its entire length is not ipso facto negligence, particularly when it can be safely negotiated by an automobile proceeding at a moderate rate of speed. Justice McNamee, concurring on the ground that no negligence of the state had been shown, knew of no Court of Appeals decision indicating that the standard of highway safety has been raised as a matter of law, or that barriers are required to protect a traveler on a highway from running off the road.

Refuse and Garbage Collection Consolidated

Wichita, Kansas (184,115 in 1943), recently entered into a contract for the collection and disposal of rubbish and trash by the firm which has been collecting garbage. Private trash haulers licensed by the city formerly charged high fees ranging from $12 to $24 a year for residences, the service had not been reliable, and there were numerous complaints from citizens. It was estimated that the 143 licensed trash haulers were averaging at least $20 per day for each truck, which means that the previous unsatisfactory service was costing the citizens approximately $850,000 a year. Under the new contract the cost of garbage collection will continue to be paid from the ad valorem tax but householders will pay $2 a quarter for rubbish and trash collection from single-family residences as compared with $3 to $6 a quarter under the previous plan. The use of the rubbish and trash collection service is on a voluntary basis but the householder is held responsible for maintaining his premises in a sanitary condition. The city will bill and collect service charges for the contractor and will receive 25 per cent of the gross revenue to cover the cost of this service. The city does not guarantee any minimum amount to the contractor. Residential service will be provided weekly in the summer and every two weeks in the winter with daily service for commercial institutions. The trash collections contract runs for nearly six years with the provision that the city retains the right to terminate the contract and purchase the property of the contractor in 1948.—From *Public Management.*

"Revive" Failing Sewers THIS EASY, PERMANENT WAY

Relining failed sewers is easy and quick — and permanent — with long lengths of sturdy Asbestos-Bonded ARMCO Pipe.

★ ★ ★

You can give failing sewers many more years of useful life by relining with durable, easy-to-install Asbestos-Bonded ARMCO Pipe. Job costs are low and the work moves fast. Long lengths of pipe, quickly joined with special inside band couplers, speed the job. Waterway is reduced a minimum because of the relatively thin walls of the corrugated pipe.

Fast as the work goes, you build for *permanence.* Flexible corrugated metal outlaws breakage. Corrosion is shackled by a full bituminous coating tightly bonded to the base metal. A thick bituminous pavement checks erosive action of sewage; makes the bottom last as long as the top.

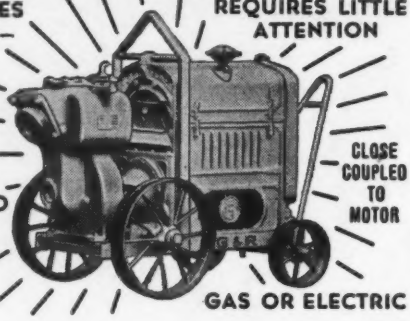
Use Asbestos-Bonded ARMCO Sewer Pipe for essential repairs now, and design it into your post-war sewerage work. That way you "build for keeps" — provide your community with efficient, lasting, trouble-free sewerage. Our 48-page ARMCO Sewer Booklet will help you in your planning. Just write to Armco Drainage Products Association, 45 Curtis St., Middletown, Ohio.

ARMCO

ASBESTOS-BONDED ARMCO SEWER PIPE

When you need special information—consult the classified READER'S SERVICE DEPT., *pages 71-73*

Streamlined Inside
for Higher Efficiency and Lower Operating Costs


RUGGED SIMPLICITY OF DESIGN ELIMINATES RECIRCULATION —
NEVER LOSES PRIME REQUIRES LITTLE ATTENTION
DELIVERS GREATER VOLUME PER GAL. OF GAS
NO ORIFICE OR PRIMING VALVES TO CLOG OR JAM
CAPACITIES UP TO 125,000 GPH
CLOSE COUPLED TO MOTOR
GAS OR ELECTRIC

Streamlined where it counts, you can't clog a Gorman-Rupp Self-Priming Pump. Unequaled in rugged efficiency, gallonage or continuous hours. A size and type for every need.

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GORMAN-RUPP
SELF-PRIMING CENTRIFUGAL PUMPS

All Sizes 2" thru 12"

CORROSION RESISTING
LASTS FOR CENTURIES
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And McWane PRECALKED cast iron pipe . . . as most everybody knows . . . costs far LESS to lay.

No joints to make. The lead and redwood wedges are placed in the pipe bells at the foundry. All you need is a hammer . . . for all you do is "socket the spigot and calk". No slow motion. No skilled labor. No other pipe lays so fast . . . or costs so little per service year. Investigate!

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Treatment of Water for Ohio Communities

In the State of Ohio there are 547 incorporated communities having water works, 115 of them cities and 432 villages.

Filtration plants are found in 56 cities with a combined population of 3,193,475; and in 100 villages with a combined population of 187,850. All but 5 of the cities supplement filtration with chlorination, as do 50 of the villages, including the smallest filtered supply in the State, which serves 130 population.

Of the above, 28 cities and 73 villages have water softening plants, 8 others can be operated as softening plants, and another had a softening plant under construction in January, 1945, when these data were compiled by the State Dept. of Health. One city and one village have softening plants but no filters. The softening plants included above employ the lime or lime-soda ash process; one a combined lime-zeolite; and one uses lime for fluoride reduction, with only slight softening.

In addition to the above, zeolite water softening is employed by 5 cities and 18 villages, with a combined population of 92,528. All but one of these supplies are ground water, and that one purifies the water before softening. Iron removal by aeration and filtration is practiced by 11 of these plants, and iron removal by base exchange by one. Seven of these 23 supplies are chlorinated.

Ground water supplies used by 17 cities and 44 villages with a combined population of 593,018 are treated by chlorine disinfection only; and the same is true of surface water supplies for one city and 4 villages. No cities or villages use surface supplies entirely untreated; but untreated ground water is used by 9 cities and 162 villages with a combined population of 295,522 (one of these is a fire supply without service connections).

In addition to the above, 5 cities and 21 villages treat their ground water supplies for iron removal by aeration, sedimentation and rapid sand filtration; 2 of them applying chemical treatment before sedimentation. One uses manganese zeolite.

A considerable number of municipalities obtain their supplies from other municipalities, these including 21 cities with a combined population of 333,552, and 82 villages with a combined population of 127,653. Of the 21 cities, 12 obtain their supply from Cleveland, 3 from Columbus and 3 from Cincinnati. Of the 82 villages, 34 are supplied by Cleveland, 15 by Cincinnati, 5 by Columbus. No other municipality supplies more than 2 besides itself.

The supplies of 9 of the 115 cities of the State are privately owned and 19 of the 432 villages.

The above is compiled from data prepared by the Sanitary Engineering Division of the Ohio Dept. of Health, as of January 1945; the population figures used being those of the 1940 census.

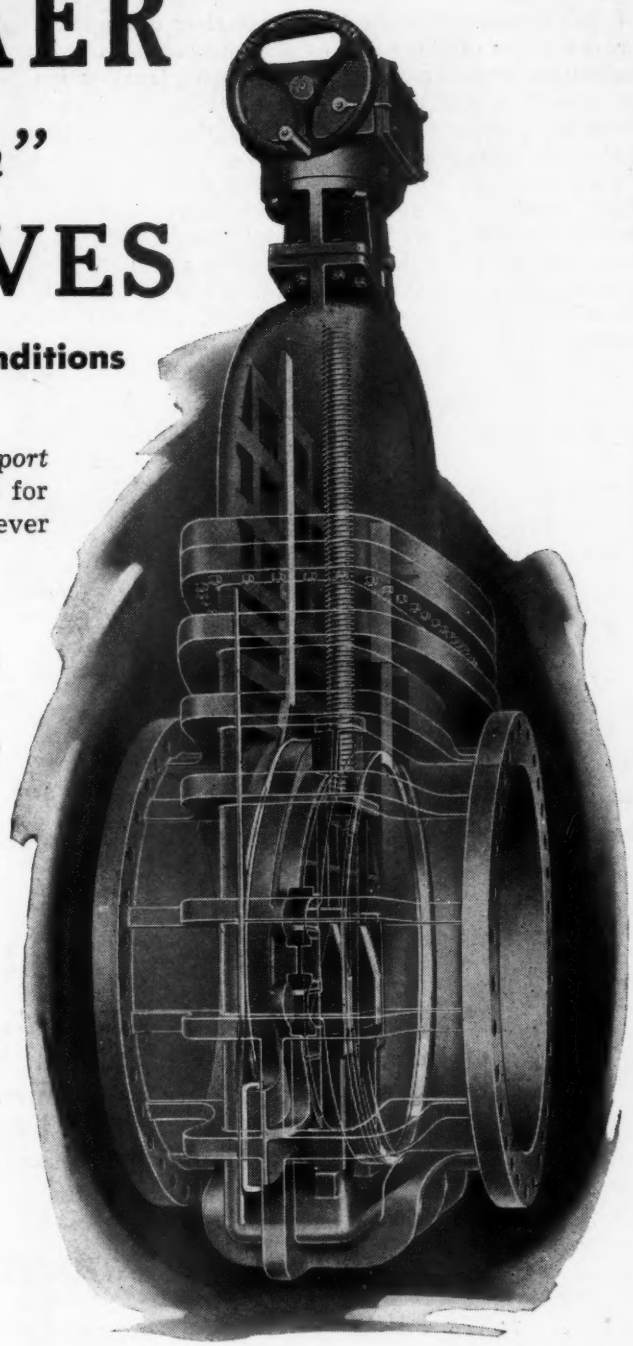
No Bug Count in Maine

Until further notice the State Bureau of Health of Maine through its Division of Sanitary Engineering will discontinue the examination for the so-called "total count" or total number of bacteria in all public and similar water supplies. They regret that this service has to be discontinued, but due to the increasing difficulty of securing the agar or media used as a food necessary in the examination, they are forced to take this action. This part of the examination will be resumed as soon as the proper materials become available.

RENSSELAER

"Square Bottom" GATE VALVES

For the *most severe* service conditions



This construction provides *three point support* thru-out the length of gate travel. It is *ideal* for valves subject to *throttling* service or wherever appreciable differentials in head exist. They are *very popular* as *Wash Water* valves.

Conceived by RENSSELAER in 1916, this design has received widespread acclaim and the flattery of much imitation.

To avoid unsuitable substitutes, check these points:

1.—Stainless steel gate shoes.

2.—Heavy Bronze side tracks—continued up into bonnet.

3.—Heavy Bronze center guide—extending down into case.

4—No obstructions across Port openings.

5.—Experience in building these valves requiring high accuracy of design and fabrication.

There has never been developed an effective substitute for good material and workmanship backed by sound design.

***"Ask the man who uses* RENSSELAER"**

RENSSELAER VALVE CO., TROY, N. Y.

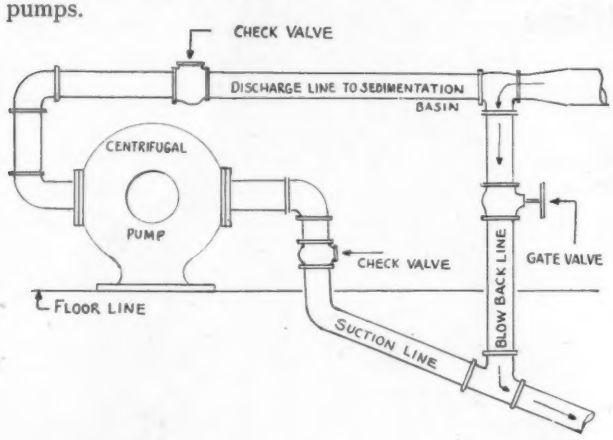
When you need special information—consult the classified READER'S SERVICE DEPT., *pages 71-73*

Device for Cleaning Suction Screens

By FRANK J. RETTIG
Engineer, Water Works Dept., North Vernon, Ind.

THE North Vernon, Indiana, municipal water supply is taken from the Muscatuck river through the suction pipes of three pumps and pumped to a sedimentation basin (part of the filtration plant) which is located on a hill 117 ft. above and 600 ft. distant from the pumping station. The rising main is a 10" heavy steel flanged pipe.

We have had considerable trouble with the suction lines, especially in time of flood, because the screens would be choked with leaves and other debris, the removing of which was usually quite a trouble and expense, as it was done by hand. When so clogged, there was of course quite a waste of power at the pumps.



A few months ago, with the help of our local plumber, we devised and constructed a means of overcoming this trouble which has proved very satisfactory. By-passes were installed connecting each suction line with the discharge line, with check and gate valves, as shown in the accompanying sketch. The gate valve is closed except when cleaning the screen. By opening this, water from the sedimentation basin flows back through the discharge and suction lines and out through the screen under the 117 ft. head, cleaning the screen in a few minutes and with no trouble except opening and closing the valve, and no expense except the loss of a little unfiltered water.

Airport Revenues

"The important part that terminal services and the little miscellaneous items can play in financing an airport is admirably illustrated in the 1944 fiscal year statement of the Washington National Airport. Out of a gross income of $516,470, the airport took $90,968 from the sales of food, tobacco, newspapers, locker space, paper cups, conducted tours, napkin dispensers and other odd items. Sales of food in the restaurant, coffee shop, hangar cafe, public roads and employees' cafeteria, and in the form of box lunches and meals aloft brought in $79,632. Other revenue items in general classifications during the 1944 fiscal year were rentals, $120,116; landing fees, $30,675; ramp service, $17.042; charter and sightseeing service, $2,000; gasoline concession, $150,00; taxicab and bus concessions, $15,85; sale of utilities, $75,458. The 1944 income compares favorably with the $443,901 taken in the 12 months ending June 30, 1943." NAA "News Letter."

An Announcement

Mr. William Muirhead is now overseas on a special mission at the request of the United States Government. Until such time as this mission is completed and Mr. Muirhead returns to active direction of the affairs of our company, every phase of construction activities will continue vigorously and without interruption under the direction of Mr. Hal S. Crain, Executive Vice President.

Post-War Construction Planning

We solicit consultations regarding construction problems involved in post-war new construction and conversion programs with the assurance that you will receive the same efficient, prompt, and specialized service which we have always rendered.

Wm. MUIRHEAD CONSTRUCTION COMPANY, Inc.

CONTRACTORS & ENGINEERS **DURHAM, NORTH CAROLINA**

INDUSTRIAL — PUBLIC WORKS — POWER PLANT — HEAVY MASONRY — BUILDING CONSTRUCTION

Soft WATER CAN HELP SOLVE A *hard* PROBLEM MANY CITIES MUST FACE IN POSTWAR . . .

How to attract industry . . . how to make citizens happy and contented—this is the problem confronting municipal management as the end of the war approaches.

One thing that's sure to click, with industrialist and resident alike, is *good* city water—water free of hardness, dirt and iron.

Permutit* Water Conditioning equipment removes the impurities found in all natural water supplies. It makes a city completely independent of local water conditions.

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Write to The Permutit Company, Dept. G4, 330 West 42nd St., New York 18, N. Y., or Permutit Company of Canada, Ltd., Montreal.

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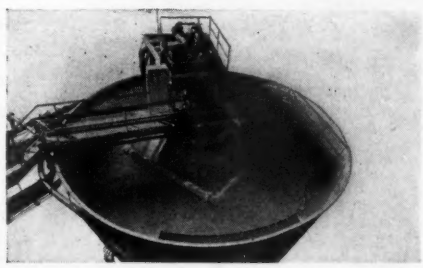

PERMUTIT SPAULDING PRECIPITATOR removes water hardness, dirt and color by the sludge blanket process. This new-design equipment cuts detention time, saves chemicals, takes only half the space of former methods. This is one of several Permutit methods for treating water supplies.

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WATER CONDITIONING HEADQUARTERS

When you need special information—consult the classified **READER'S SERVICE DEPT.**, *pages 71-73*

Raising Valve Boxes to New Pavement Grades

How the Water Department raised thirty valve boxes covered with 4 inches of macadam

By WILLIAM R. JOHNSON
Superintendent of Water Department, Saugerties, N. Y.

FROM the southern limit of the incorporated village of Saugerties, N. Y., to the northern, on Route 9-W, a distance of a mile, the highway was paved with brick with a 2″ sand cushion on a 6″ concrete base. This pavement became badly cracked and has been repaired by the State Highway Dept. with a 4″ macadam surface on top of the brick. This macadam covered thirty valve boxes of 6″ and 8″ valves of the village water system.

We knew that many if not all of these valves needed new packing, scraping and oiling, and we decided to do this, which necessitated digging down to them.

The most difficult part of this was cutting through the concrete, brick and macadam pavement. To do this by hand would have been a long, hard job, and we had no air compressor for operating drills, so we purchased a gasoline pavement breaking hammer from the Syntron Company.

Using this hammer and its tools, we cut a block about 26 x 36 in. out of the pavement in about 1½ hours. After digging down to the valve and removing the valve box, the valve was repacked and oiled and put in good condition. The boxes were of the telescoping type and we found a number of them with the upper and lower sections corroded together. In such cases, new boxes were installed. All the boxes were raised to 1″ above the road level and backfilling tamped solidly into the hole. In a few days the top of the box settled to the level of the road.

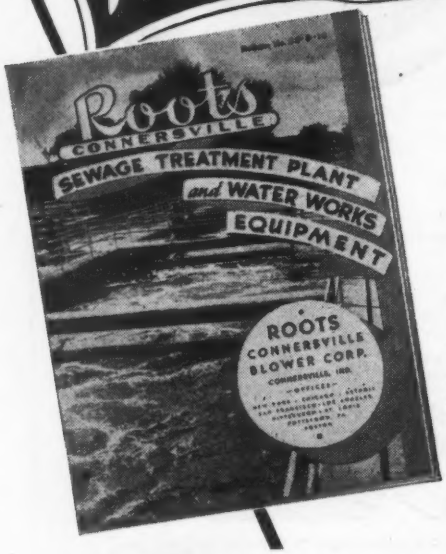
We started the job about Sept. 1st, 1944 and finished the 30 valves about October 15th.

We find it a great asset to know the location of all our valves and that they are in good working condition. This can be assured only by opening and closing every valve at least once a year. If the disc does not entirely enter the valve seat because of sediment, this can generally be removed by closing and opening the valve a few times. Using too much strength in operating 4″ and 6″ valves may break the stem, and only one of our men is permitted to handle these small valves.

Wisconsin's Well Construction Code Has Teeth and Uses Them

On May 11th of this year the State Board of Health of Wisconsin revoked the well drilling permits of two firms for "consistent failure to submit well construction reports within the time and in the manner required by Section 31, Wisconsin Well Construction Code." Frequent failure to submit water samples and to locate and construct wells in conformity with governing regulations were also considered. "Persistent disregard of rules and regulations for the protection of the public health is an offense of such gravity in its effect upon the lives and health of others," said the Board, "that restraint of the offender is a necessary safeguard."

you need this BULLETIN



for
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It gives much interesting and helpful information on positive displacement and centrifugal aerating blowers, positive displacement digester gas meters, and filter vacuum pumps. The vital part played by air in sewage treatment is explained, together with the advantages of various types, drives, etc. Typical "R-C" installations are also shown. We have a copy of Bulletin 23-B-12 for you.

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It doesn't make sense, folks

A man's a fool to go around with his pants pocket burning with extra folding money when he ought to buy an extra Bond, because that loose lettuce is the stuff inflation is made of. When that extra dough goes hunting for civilian goods (that are as hard to find as Crosby in a tuxedo!), it tends to push up prices. Besides, it doesn't make sense when twelve million kids are fighting our battle for any of us to hike up the cost of living by buying anything we can live without.

Bob Hope

ONE PERSON CAN START IT!

You give inflation a boost . . .

—when you buy anything you can do without

—when you buy above ceiling or without giving up stamps (Black Market!)

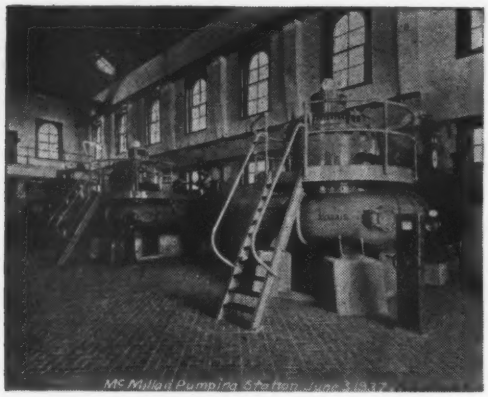
—when you ask more money for your services or the goods you sell.

SAVE YOUR MONEY. Buy and hold all the War Bonds you can afford—to pay for the war and protect your own future. Keep up your insurance.

HELP US KEEP PRICES DOWN

A United States War message prepared by the War Advertising Council; approved by the Office of War Information; and contributed by this magazine in cooperation with the Magazine Publishers of America

When you need special information—consult the classified **READER'S SERVICE DEPT.**, *pages 71-73*



McMillan pumping station, Washington, D. C.

The Waterworks Digest

Abstracts of the main features of all important articles dealing with waterworks and water purification that appeared in the previous month's periodicals.

Design Of Valves

The gate valves of today are built from designs made 30 years or more ago. The gates, usually in two parts, have their only support in the center and tip up and should be guided away from the seat rings. The stem thrust is inadequately provided for. There is no lubrication at the thrust points. There is no means of making internal inspection of large gates without completely removing the cover. Gates should be designed to close against velocity head caused by a break. The gate should be guided away from the seat until the point of seating is reached. The stem should have a support at the lower end. All operating parts should be totally enclosed and lubricated from the street level. An indicator, readable from street level, should show turns made and be stamped with maximum number of turns. Operating nut preferably at street level. Means provided to prevent breakage of valve parts. Stems should have adequate strength and anti-friction means of absorbing thrust. If valves are geared, stem threads should have greater helix angle and increased reduction gearing ratio. Ease of maintenance and repair in vault, and room in vault for making repairs. Screw should turn right to close, left to open.[X7]

Cross-Connections Policy of A.W.W.E. Co.

The American Water Works & Electric Co. is the largest private water utility in the U. S., serving 703,881 customers in 21 states and Cuba. Its president in 1944 appointed a committee to study cross-connections and, following its recommendations, the company adopted the policy that the manager of each company of the system establish legally rules and regulations concerning cross-connections, and all officials endeavor to secure everywhere as thorough control of cross-connections as is possible. No cross-connections should be installed unless the other supply is approved by the State Department of Health, the consent of the company be obtained, and the connection comply strictly with all laws, ordinances, rules and regulations. No existing cross-connections shall continue in use unless the company be notified of it and consent.[A64*]

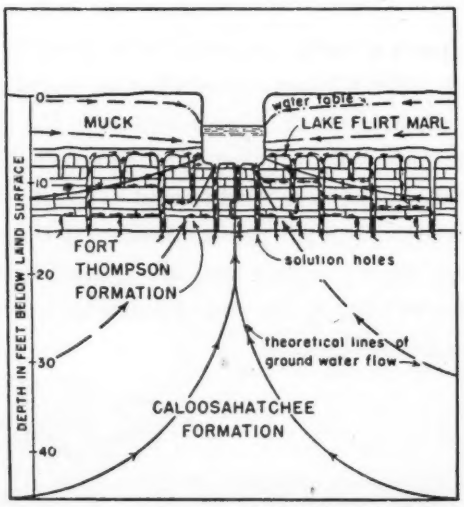
Britain's National Water Policy

A policy has been proposed by the British government for dealing with the water supply and sewerage of England and Wales. There are over 1,000 water undertakers operating under statutory powers, and many others not so operating. Yet 30% of the rural population depend on private wells, many of them not above suspicion as to pollution. It is proposed to set up "River Boards," each to deal with all matters relating to its own river. There is to be control of private wells, including the amount of water withdrawn and conditions that might pollute the underground water. A Rural Water Supply and Sewerage Bill has been passed appropriating $60,000,000 for England and Wales and $25,500,000 for Scotland to aid in providing water supply and sewerage in rural areas at reasonable costs, which can be subsidized by the counties. The Minister of Health is to be in responsible charge, advised by a Central Advisory Committee and by regional Water Committees. Stringent measures are to be taken to prevent undue lowering of the underground water table, and pollution of underground sources. Water undertakings may be required to give bulk supplies to one another on reasonable terms.[A66*]

Salt Water Encroachment in Florida

Drainage for reclaiming swamp lands in southern Florida has upset the delicate balance that exists between salt water and fresh water in the aquifer along the coast, and has generally lowered the water table almost to sea level several miles inland from the ocean. This has resulted in the incursion of salt water in uncontrolled canals at times as far as 10 miles from the source of the salt water, and has brought about local salting of ground water apart from the contamination that is taking place at depth in the aquifer. This latter form of salt water encroachment has moved landward in an uneven front, with lobes extending inland along some of the drainage canals for several miles. This movement is in direct consequence of a lowered water table, and is especially notable along the Atlantic Coastal Ridge, where the fresh water head is no longer sufficient to prevent encroachment of salt water. This movement will continue until a point is reached where the average annual height of the fresh water above mean sea level is sufficient to prevent further encroachment.

Salty water from remnants of bodies of sea water



Courtesy Journal A. W. W. A.

Cross-section under canal, showing canal in effluent condition and salty ground water contaminating it.

*See Bibliography in the June issue.

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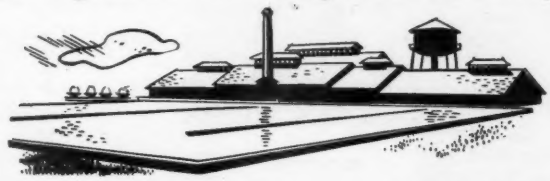

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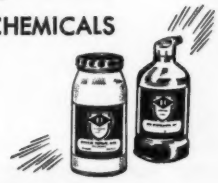

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trapped in the formation during the Pleistocene is also a source of contamination.[A75]

Salt Water Disposal in Oil Fields

In Illinois, very little cooperative effort has been made in water drive pools to dispose of salt water into the producing strata by means of edge wells before such wells are abandoned and plugged. In dissolved gas drive pools, little or no effort is being made to utilize salt water by perforating the upper strata in depleted edge wells and permitting the salt water to flood the lower producing stratum. Both types of pools require cooperative programs.[A78]

Every major river in Texas is contaminated to some extent with salt water from oil wells. It is recommended that a Salt Water Control Commission be created, with authority to prescribe regulations for operation of oil wells, to shut down any well that permits salt water to enter a water course or fresh water-bearing stratum, and to require that no well be drilled for oil unless the producer has made arrangements for the disposal of the salt water that are satisfactory to the commission.[A80]

Softening Colorado River Water

Colorado river water is furnished by the Metropolitan Water District of Southern California to supplement existing supplies, and the flow rate therefore is quite low during the rainy season, and this was considered in selecting the softening method to reduce the average hardness of 375 ppm to 85-100 ppm. The method adopted was to treat all the water with enough lime to neutralize the free CO_2 and reduce the carbonate hardness to a minimum; filter; carbonate a portion to a suitable pH and soften by zeolite beds to zero hardness; then mix the two portions to give the desired hardness.

When this water was turned into mains that had for years contained water of a different character, deposits and growths sloughed off. This was prevented by removing only part of the carbonate hardness by the lime treatment, but this put a greater burden on the zeolite beds. In winter, with the use of this water less than 10% of that in summer, the lime treatment was omitted entirely; filter runs then increased three or four fold. This change, however, reduced the zeolite plant capacity from 100 mgd to 75. New zeolite gives maximum exchange when regenerated with a weak brine at a slow rate, but after three years of service, better regeneration is obtained with stronger brine at a faster rate.

A new electrolytic softening process is being tried, a reduction in anion concentration and in hardness being effected by passing a direct current through the water.[A71*]

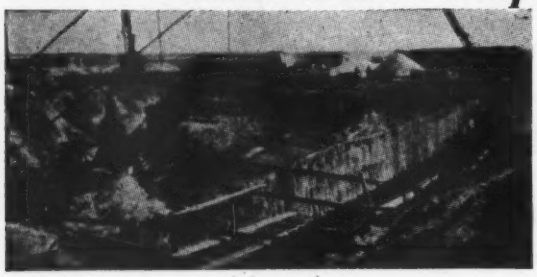
Lessons From the Hurricane

The 1944 hurricane in the northeast demonstrated that the sources of power and water should be made more reliable, there should be more adequate interconnections between adjacent systems, and greater amounts of elevated storage. Most of the successes in preventing or limiting interruptions in service during the hurricane were due to the presence of gasoline, diesel or steam-driven auxiliary prime movers, which should have a capacity of at least 2/3 the normal average consumption and should be operated under load conditions for a few hours at least once a month. Enough fuel for them should be kept on hand to run them for a number of days.

Interconnections with adjacent systems was the next most effective means of continuing service. Such connections are desirable even if pipes must be laid across intervening open country.[A72]

Of 30 supplies in Nassau County, N. Y., 27 were operated by electricity of which 25 suffered interruptions in electric power. Of the remaining two using electricity, one had the power cables laid underground. Three use diesel or steam power. Emergency in-

Some Griffin Wellpoint Jobs



GRIFFIN SYSTEM COST ZERO

The engineers invested in tons of steel sheeting for the construction of this power plant foundation, expecting plenty of water trouble, but GRIFFIN Wellpoints in the fine silty sand so successfully stabilized it, the sheeting was actually unnecessary.

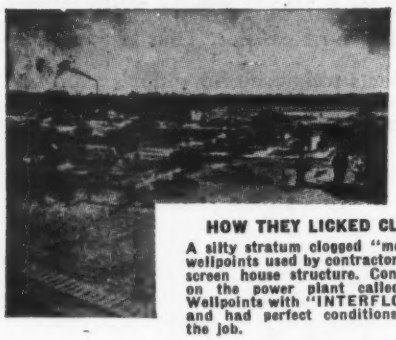
When a new addition to the plant was started, a GRIFFIN System was again on the job—and no sheeting was purchased, as all banks could be sloped. The saving of this one item was greater than cost of the wellpoint installation.

PROFITABLE PILE DRIVING

Pile-driving equipment working on a dry bottom 18-feet below original water level. No mats to be shifted — no lost time—thanks to the Griffin Wellpoint System.

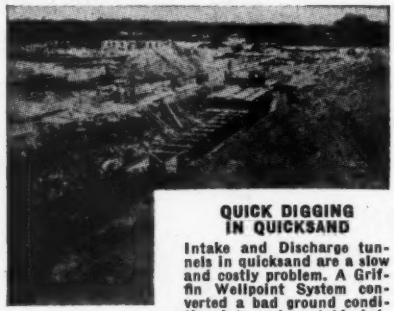
KEEPING A HILL OUT OF A HOLE

Open pumping undermined the spring-filled hill at the right, a mass movement into the partly excavated site had started. The installation of a GUARANTEED Griffin Wellpoint System saved the day.



HOW THEY LICKED CLOGGING

A silty stratum clogged "mesh-covered" wellpoints used by contractor "A" on the screen house structure. Contractor "B" on the power plant called in Griffin Wellpoints with "INTERFLOW" screens, and had perfect conditions throughout the job.



QUICK DIGGING IN QUICKSAND

Intake and Discharge tunnels in quicksand are a slow and costly problem. A Griffin Wellpoint System converted a bad ground condition into a dry, stable bottom in a FEW HOURS.

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terconnections were used between 11 supplies, 95 permanent connections having been made in 1942 and 1943.[A73]

Experiences of 38 systems along the New Jersey shore led to the recommendation of 13 measures to reduce the probability of interruptions of service. Among these measures are: emergency connections with adjoining municipalities; if this is not possible, 2½" hose connecting hydrants in adjoining system; OCD or fire department pumpers to pump water from suction reservoirs into the mains. For deep well pumping, auxiliary right-angle drive gasoline-engine-driven pumps should be installed.[A74]

Repairing Water Meters

Chicago has about 115,000 meters in service. Over 15,000 were repaired in the meter shop in 1943. Every practicable means of reconditioning meters and meter parts is practiced, the work requiring a field force of 9 trucks and 45 machinists in the shop. Meters are brought to the shop after having served beyond specified limits (150,000 cu. ft. for ⅝" meters to 2,500,000 cu. ft. for 2"); or because of complaints of consumers. In the shop, all nonferrous parts are cleaned by passing the various pieces through five baths: 1st, 1 lb. caustic potash to 1 gal. of boiling water; 2nd, 3 parts nitric acid to 1 part water; 3rd, 1 part sulphuric acid, 1 part nitric acid and 1 part water; 4th, cold water; 5th, hot water; standing only 3 or 4 seconds in the acid baths. Warped discs are reconditioned by immersing in boiling water for about 15 min. and then pressed into shape in a hand press. If the disc half-balls are out of shape or badly worn they are turned down to the next smallest size for use in repairing other meters. Distorted gear trains are straightened in special jigs. Where the ball sockets are worn they are bushed with material as good as or better than the original, soldered into place, and then turned to fit an undersize ball, and re-turned to fit a larger size when it becomes worn, repeating this several times. But for ⅝" meters it is more economical to increase the size of the balls and turn the ball socket to fit.[E15]

San Francisco maintains 135,000 meters, of which 125,000 are ⅝". They are not changed after specified service. In the shop the casings are washed and dipped in normal strength commercial muriatic acid and washed again. Gear trains, chambers and dials are soaked for 20 to 30 min. in 1 part sulphuric acid to 5 parts water, then for a few seconds in 2 parts sulphuric acid to 1 part nitric and then washed in cold water. Flat discs are heated in hot water and pressed between flat plates in a vise. Conical discs are not repaired.

St. Louis removes all meters 4" and smaller after 5 yrs. of service—to be increased to 8 yr. Warped discs are not straightened. Gear trains are rebushed and repaired.

Milwaukee is 100% metered, with 98,950 in service. Meters are removed for overhauling as in Chicago. If one does not pass the flow test it is disassembled, washed in hot water and treated with No. 32 Oakite compound. If chambers are badly worn, shims are placed under the top and bottom balls and the disc is ground in the chamber with emery to make a perfect fit. Hard rubber bushings are installed in gear trains wherever possible. Warped rubber discs are discarded and replaced with "no-warp" discs.

Los Angeles is 100% metered with 320,366 in service. In 1944 the meter shop repaired 11,500. Tests of over 4,500 small meters indicate that they remain reasonably accurate for at least 20 yrs., but monthly readings are closely checked. They find that replacement is less expensive than machining or refabrication. When brought to the shop, a meter is cleaned on the outside with a wire brush or sandblasting; the internal machined parts with a scrubbing brush and water, or a hand scraper for severe corrosion deposits. Warped discs are remolded in a precision die. Worn disc balls are ground to a perfect fit in the measuring chamber by use of a water-solvent grinding compound after the half-balls have been shimmed.[E16]

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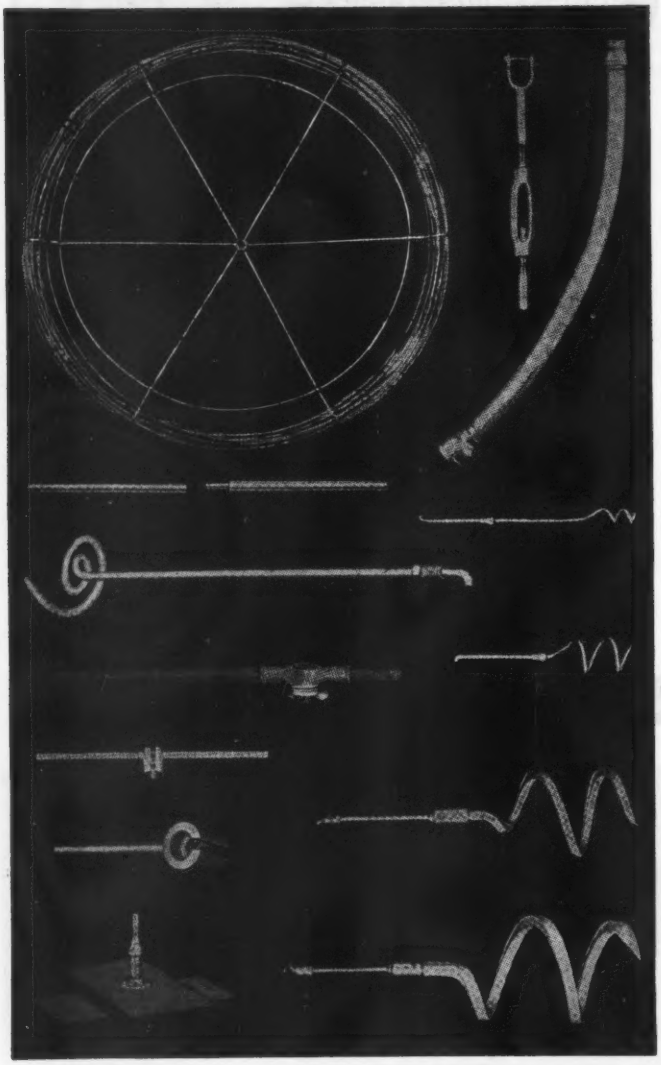

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The articles in each magazine are numbered continuously throughout the year, beginning with our January issue.

c. Indicates construction article; *n,* note or short article; *p,* paper before a society (complete or abstract); *t,* technical article;

A *Journal, American Water Works Ass'n*

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72. Recent Hurricane Experiences in the Northeast. By Reeves Newsom. Pp. 505-511.
73. Hurricane Experiences in Nassau County, N. Y. By J. Lloyd Barron. Pp. 512-515.
74. Interruptions in Electrical Supply Along New Jersey Shore During 1944 Hurricane. By Robert M. Cadman. Pp. 516-525.
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78. Methods of Salt Water Disposal in Oil Fields. By W. S. Morris and Samuel F. Peterson. Pp. 569-576.
79. Impounding Reservoirs for Salt Water Disposal. By M. F. Granville. Pp. 577-578.
80. Control of Salt Water Intrusion in Texas. By A. M. Breneke. Pp. 579-584.
81. 1944 Census of U. S. Municipal Water Softening Plants. By H. M. Olson. Pp. 585-592.

B *Journal, New England Water Works Ass'n*

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30. *c.* Submarine Pipe Lines in Deep Water at Portland, Me. By James R. Gardiner. Pp. 148-162.
31. Corrosion of Copper and Copper Base Alloys in Fresh Water. By C. L. Bulow. Pp. 163-182.
32. Sanitation Manual for Public Ground Water Supplies. By U. S. Public Health Service. Pp. 183-231.

D *The Surveyor*

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7. *p.* Treatment of Doubtful Waters for Public Supplies. By Norman J. Pugh. Pp. 263-264.
8. *p.* A Fresh Approach to the Problem of Precipitation Tank Design. By Ian M. E. Aitken. Pp. 265-267.

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9. Principles of Water Purification. By Delwyn G. Davies. P. 297.
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E *Engineering News-Record*

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15. Water Meter Shop Practice in Chicago. Pp. 84-88.
16. Water Meter Repairs as Practiced in Seven Large Cities. Pp. 88-90.

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32. Supply for Housing Authority at Vancouver, Wash. By Leonard R. Incledon. Pp. 558-561.
33. Russians Use Sun's Heat to Provide Hot Water Supply. By V. A. Fedoseyev. Pp. 561, 580.
34. Water Quality Control for U. S. Army Installations. By W. A. Hardenbergh. Pp. 574-575.
35. Silver-Copper-Lead Pipe Developed in Great Britain. P. 575.

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36. Emergency Filter Plant Avoids Repetition of Recent Shutdown. By I. M. Glace. Pp. 610-613.
37. Meter Practice Schools Are Being Held in Texas. Pp. 617, 637.

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38. Radio-Asset or Liability to the Waterworks Industry. By Roi B. Woolley. Pp. 660-663.

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11. Mobile's Wartime Struggle for Water. By H. E. Myers. Pp. 87-89, 121.
12. New Taste and Odor Control Process. Pp. 110-111.
13. Why Not a Two-Main Water System for Your City? Pp. 116-117.

K *Proceedings, American Soc'y of Civil Engineers*

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5. Water Supply Engineering. Report of Committee of the Sanitary Engineering Division. Pp. 673-690.

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6. Correlating Flood Control and Water Supply, Los Angeles Coastal Plain. By Finley B. Laverty. Pp. 831-848.

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31. *c.* Revamping a Rock Well in Madison, Wis. By L. A. Smith. Pp. 18-20.
32. *c.* Coarse-Filtering a Mountain Stream for Red Lodge, Mont. By W. P. Burke. Pp. 24-26.
33. Collecting Water Samples for Bacteriological Analysis. P. 27.
34. *n.* Financing Water Main Extensions in Belmont, Mass. P. 37.
35. Do You Know Your Water Supply Is a Safe One? Pp. 54-55.

V *Journal, Maine Water Utilities Ass'n*

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4. Wartime Improvements to the System of the Kittery Water District. By Paul F. Howard. Pp. 44-50.

X *Journal, New Hampshire Water Works Ass'n*

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7. Maintenance and Design of Water Works Valves. By Payne Dean. Pp. 4-7.

Z *Journal, Missouri Water and Sewerage Conference*

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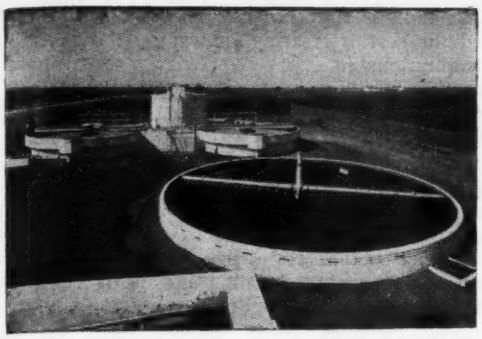
7. Bacterial Resistance to Chlorine and Chloramines. P. 8.
8. Improvements Made to Monroe City Water Plant. By F. B. Bridges. Pp. 9-10.
9. A Copper Sulfate Test for Algae Control. Pp. 16-19.



Disposal Plant at Stockton, Calif., state hospital.

The Sewerage Digest

Abstracts of the main features of all important articles dealing with sewerage and sewage treatment that appeared in the previous month's periodicals.

Grease and Oils in Sewage

Difficulties experienced in sewage treatment because of high grease content include overloading of skimming facilities; heavy accumulation of floating scum in digestion tanks; clogging of sludge and sewage piping; clogging and reduction in the life of vacuum filter cloths; increased air consumption in activated sludge units; interference with oxidation by trickling filters. Oil wastes from garages, filling stations, wash racks, oil cargo ships, ship yards, gas plants and oil fields cause many problems. Cutting oils used in machine shops and industrial plants, if neutralized or diluted at their source, are seldom very troublesome.

The program of industrial waste control in Los Angeles included passage of ordinances making it illegal to discharge an industrial waste at a temperature above 100° F, or containing more than 1,000 ppm suspended solids or more than 600 ppm oil; inflammable or explosive wastes, or chemicals, grease, oil or tar in amounts sufficient to affect the operation of a sewer system. Included in such a program are field investigations by means of a trailer laboratory equipped for sewage and industrial waste analysis; service charge to industries based upon the extra cost of maintenance, treatment and disposal of their wastes; requirement of pretreatment facilities; research on the reclamation of salable by-products recovered at sewage treatment plants; regular inspections of industrial wastes pretreatment facilities, including small grease and oil traps; requirement of permits for discharge of industrial wastes to public sewers.

At New Britain, Conn., in 1942, heavy oils removed at the sewage treatment plant averaged 434 cu. ft. a day. Many of the manufacturers, being appealed to, removed these at the point of discharge and dumped them at the sewage plant dump and covered them with incinerator ash.[C47]

War industries at Lancaster, Pa., contributed large quantities of oxidizing or drying oils to the sewage treated at the activated sludge plant, as much as 1768 ppm of total grease being found. Most of this is easily disposed of by flotation and incineration, but appreciable quantities reach the aeration tanks, reducing the D. O. in the aerators from the normal 3.6 ppm to 1.1 ppm; it retarded sludge digestion from an average volatile reduction of 56.6% to 47.9%; and the sludge drying period increased from 32 days to 48 days. Mineral oils had similar effects on digestion and secondary treatment; in primary treatment it was more difficult to remove the floating oil, which was greatly facilitated by applying fine wood shavings and even dried grass.[C50]

Nitrification In Biofilters

The nitrite and nitrate content of the effluent from a biofilter and a standard filter were determined for a period of a year; also the nitrifying capacity, defined as "the potential capacity of the biological material to produce nitrates under certain empirical and standard conditions in the laboratory." The results show that, in general, nitrite and nitrate production in the biofilter was small and variable, while in the standard filter, nitrification was consistently high during the entire period. But the nitrifying organisms were well established in the biofilter as measured by the ability of the film to produce nitrites and nitrates upon aeration.

The highest nitrifying capacity was found in the top 2-foot level of both filters. The ratio of nitrates to nitrites, both in the effluent and in the determination of nitrifying capacity of the film, is narrower in the biofilter than in the standard filter.

The evidence presented supports the view that the difference between the biofilter and the standard filter is merely quantitative. The organisms are well established in the biofilter, but with the high rates of application the time of contact is not long enough for them to produce appreciable quantities of nitrites and nitrates.[C53]

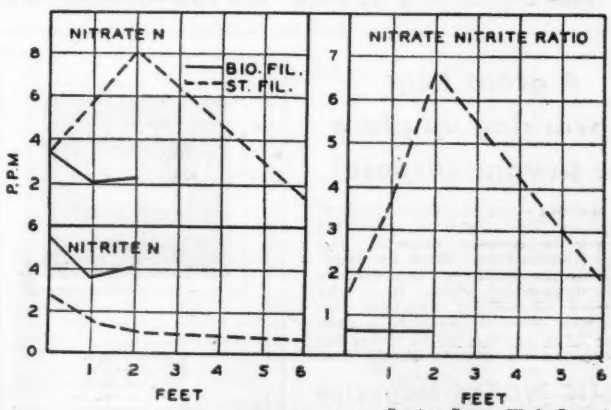
Supernatant in Digestion Tanks

Supernatant liquor production is a function of the loading of the digesters; production of 50% supernatant may be considered optimum.

Optimum loading of two-stage digesters appears to be about 0.1 lb. of dry volatile solids per cu. ft. of effective primary digestion capacity per day if the digestion temperature is maintained at 82° to 84° F. The total digestion capacity (primary and secondary) required would be about 2 cu. ft. per capita for effective digestion and sludge concentration. Two-stage digesion tanks are considered to receive maximum loading when about 40% of the fresh solids volume added can be obtained as supernatant liquor. Higher loadings than 0.1 lb. dry volatile solids per day cu. ft. of effective primary digestion capacity result in decreased supernatant production, and lower loadings in increased. When the loading is approximately twice the allowed maximum, no clear supernatant can be obtained. If the loading is greater than the maximum allowable, the suspended solids in the supernatant increase, and also operation difficulties, and the final sludge disposal facilities are taxed.[C55]

Charge for Treating Wastes

There may be valid arguments in some cases for treating the liquid wastes of industries in municipal plants without charge, but if the amount of revenue brought to



Courtesy Sewage Works Journal

Comparison of nitrite and nitrate producing capacities of the film from the different levels of the biofilter and standard filter.

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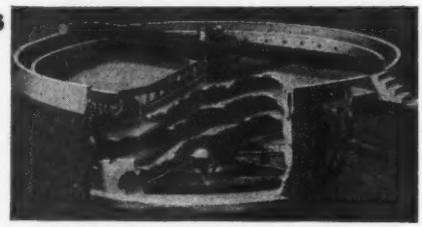

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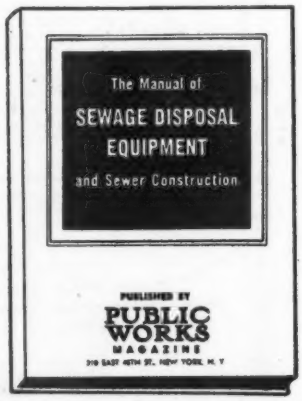

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a city by an industry in taxes and population increase does not exceed the cost of treating its wastes, the advisability of this is questionable.

The author considers the most equitable method of charging for treatment is on the basis of suspended solids and BOD contributed to the sewage reaching the plant, to include a proportionate part of both fixed charges and operating costs. One method is to charge only for the units of suspended solids and BOD by which the industrial waste exceeds the same constituents of the normal domestic sewage. Another method is to assess the industry for the entire amount of suspended solids and BOD contributed in its wastes, the city making no charge for the use of the treatment facilities. Some believe that, whichever method is employed, the industry should receive credit based on the taxes it pays to the municipality.

Regardless of charges, the industry should not be permitted to discharge strong acids or alkalis in concentrated slugs, but should supply tanks or other methods of equalizing the flow.[E5]

Enlarging Baltimore's Sewage Plant

Beginning in 1906, Baltimore has provided, at its Back River sewage works, three 150 mgd mechanically cleaned screens, three 100 mgd detritors, five 25 mgd primary sedimentation tanks, five 25-30 mgd revolving fine screens, 30 acres of trickling filters, two 70 mgd humus tanks, 20 mgd activated sludge units, three heated and ten open sludge digestion tanks with combined capacity of 2,603,000 cu. ft., and two vacuum filters of 500 sq. ft. each.

As soon as conditions permit, rotary distributors will be provided on 6¾ acres of trickling filters and the loading per acre increased; equipment for chlorinating the effluent is being installed; two digestion tanks will be added, and instruments for recording the percentage of methane in the sludge gas, depth of material in the tanks, temperature of heating water and of sludge. Two more 500 sq. ft. vacuum filters are contemplated, and two heat-drying units with 46 tons a day capacity, the dried sludge to be sold for fertilizer. These, with road construction and grading, are estimated to cost $1,235,000.[H30]

Industrial Waste Disposal

Pollution abatement programs will involve the expenditure of several hundred million dollars in the postwar period. These should be given first consideration on the basis of hydrologic regions. If a municipality wishes to solve its own problem itself, it must consider that each industry may have a variety of specific problems; that cooperation with industry is essential, and by-product recovery is not always the solution; final solution of the problem may involve complete elimination of the waste, or pretreatment of the waste before discharge into the city sewers, or acceptance of the waste for treatment by the municipality. If municipal treatment is adopted, it is fair and equitable that the industry pay its share of the cost of treatment, on the basis of volume and concentration of constituents.[C57]

Plankton in Wisconsin Lakes

A 12-month fertilization survey of three Madison, Wis., lakes has shown non-agricultural drainage to be the major contributor of inorganic nitrogen and inorganic phosphorus. Lake Waubesa received 76.9 and 89.2% of these fertilizing elements, respectively, from the effluent of the Madison sewage treatment plant. The three lakes received 73, 422 and 168 lb. of inorganic nitrogen per acre, respectively, from inflowing water during the year. The net conversion of this to organic forms varied from 46 to 51%.

The concentration of inorganic nitrogen in the surface waters of the lakes was related to the biological activity, as influenced by temperature and light intensity. Algae

blooming was shown to reduce inorganic nitrogen concentrations markedly.

Lakes receiving appreciable amounts of raw or biologically treated sewage are characterized by plentiful supplies of inorganic phosphorus during all seasons of the year. Lakes receiving limited amounts of sewage show abnormal concentrations during the winter months only.[C58]

Air Diffuser Plates and Humidity

Milwaukee has studied the effect of moisture on the efficiency of air diffusers in its activated sludge tanks and found conclusively that conditioning the air has an appreciable effect on diffusion results. The humidity there is very high and they have a great deal of trouble in keeping the air pressure down while supplying air to the tanks. At 90° relative humidity, 18.45 lb. of water per day will be put into a container of 9 plates discharging one cfm per plate, and this moisture is condensed in the container, causing the capacity of the plates to fall off 30 to 50%. (This has been experienced at Decatur, Ill., also.) From an economic standpoint this is a serious matter.[C62]

Floating an Outfall to Place

Seabees placed 2,000 ft. of 16" ball-joint cast-iron pipe across a lagoon in the Central Pacific for a sewer outfall. Records showed that very rarely did two days of calm weather with an off-shore wind occur; while high on-shore winds cause side currents at 4 knots an hour. So the work had to be completed in one day.

The pipe sections were bolted together on shore in eight 250 ft. lengths, side by side on skids. Four air-tight oil drums were fastened to each length of pipe, and a ½" steel plate bulkhead was fastened to the front end and another moved to the rear end of each length in succession as it was bolted to those already floated.

Two 3-ton anchors were placed a short distance beyond the spot where the outfall was to end, a snatch block secured to them and a cable run from the front end of the outfall, through the snatch block and back to a tractor on the beach. This was merely to guide the pipe line, which was pushed into place by two cables running from the rear of the pipe line through two blocks secured to tractors at the water's edge and back to a winch, the tractors acting as deadmen. The preparations took ten days; the launching, 12 hours.[L2]

Sludge Bulking At San Antonio, Texas

Since October, 1930, complete and reliable records of the performance of the San Antonio sewage plant have been kept. When bulking became a serious problem a few years ago, these records were studied and yielded valuable suggestions. One was that the amount of air required to treat digester overflow is much greater per pound of BOD than is required by primary tank effluent. It also appeared that the ratio of suspended solids in the returned sludge to the solids in the primary effluent should be 10 for the best clarification; although this can be increased to 20 if the returned sludge is well activated and stable. Based on these and other evidence from the records, the following procedure has been followed for over a year with greatly improved performance:

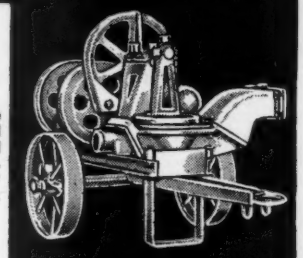
(a) The amount of returned solids is kept as closely as possible to ten times the incoming solids.

(b) The amount of air is kept at about 900 cubic feet per pound of B.O.D. of the primary effluent. If the load increases beyond our air capacity, a small amount, usually less than 10% of the flow is by-passed. This is done at night when the flow as well as the amount of the solids it carries is low.

(c) As it takes 5 days to determine by the B.O.D. test how much air is given per pound B.O.D. load, and as it is then too late to remedy the situation, we watch the sludge index carefully, to head off incipient bulking.

(d) The amount of digester supernatant going to the primary clarifiers is carefully controlled.[H32]

C. H. & E. CONSTRUCTION EQUIPMENT



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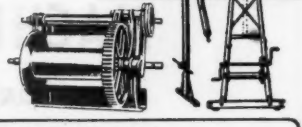

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Bibliography of Sewerage Literature

The articles in each magazine are numbered continuously throughout the year, beginning with our January issue.

c. Indicates construction article; *n*, note or short article; *p*, paper before a society (complete or abstract); *t*, technical article; *article reviewed in the "Digest."

C — *Sewage Works Journal*
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46. Effect of Industrial Activity Upon Sewage Flows. By Don E. Bloodgood. Pp. 481-483.
47. Difficulties Occasioned by Discharge of Grease and Oils Into Sewerage Systems. By Reuben F. Brown. Pp. 484-491.
48. Effects of Increased Industrial Waste Loads on Sewage Treatment Processes at Worcester, Mass. By Roy S. Lanphear. Pp. 492-496.
49. Effects of Rubber Wastes on Sewage Treatment Processes. By T. C. Schaetzle. Pp. 497-505.
50. Effects of Oxidizing Oils and Other War Industry Wastes on Sewage Treatment Works. By Robert M. Bolenius. Pp. 506-509.
51. Effects of Paper Mill Wastes on Sewage Treatment Plant Operation. By Harry W. Gehm. Pp. 510-513.
52. Effects of Industrial Wastes From Fish Canneries on Sewage Treatment Plants. By W. T. Knowlton. Pp. 514-515.
53. Nitrification and Nitrifying Capacity Films of Standard and Biofilters. By H. Heukelekian. Pp. 516-524.
54. The Application of Micro-Analytical Methods to the Examination of Sewage. By P. S. S. Dawson and S. H. Jenkins. Pp. 525-537.
55. Relation Between Loading and Supernatant Liquor in Digestion Tanks. By Willem Rudolfs and Louis J. Fontenelli. Pp 538-549.
56. Trends in Sewage Works Practice in Great Britain. By James H. Edmundson. Pp. 550-557.
57. Industrial Waste Disposal. By Geo. E. Symons. Pp. 558-572.
58. Plankton Productivity of Certain Southeastern Wisconsin Lakes as Related to Fertilization. By J. B. Lackey and C. N. Sawyer. Pp. 572-585.
59. Stream Pollution Control in Pennsylvania. By A. H. Stewart. Pp. 586-593.
60. Trickling Filters—A Discussion. By J. T. Franks. Pp. 595-602.
61. Operation of Trickling Filters. By T. C. Schaetzle. Pp. 602-605.
62. Activated Sludge Round Table. Pp. 609-617.

D — *The Surveyor*
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23. The Balancing of Strength of Sewage During Sedimentation. By S. H. Jenkins, C. H. Hewitt and F. W. Roberts. Pp. 253-254.

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24. Are We Backward in Sewage Disposal? By John Hurley. Pp. 295-296.

E — *Engineering News Record*
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5. What Is a Fair Charge for Handling Industrial Wastes in Municipal Plants? By Edmund B. Besselievre. Pp. 89-92.

H — *Sewage Works Engineering*
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30. Baltimore Plants to Be Enlarged; Fertilizer Plant to Be Added. By C. E. Keefer. Pp. 282-283.
31. Making the Akron Plant Grow Up. By T. C. Schaetzle. Pp. 284-285, 304.
32. Bulking Cured by Control of Air and Return Sludge. By E. J. M. Berg. Pp. 286-287, 295.
33. Wartime Aluminum Mill Treats Its Domestic Sewage. By Rollin F. MacDowell. Pp. 290, 310.

J — *American City*
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8. Formula for Sewerage Excellence. Pp. 92-93.

L — *Civil Engineering*
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2. *c.* Sewage Outfall Line Floated Into Place by Seabees. Pp. 281-283.

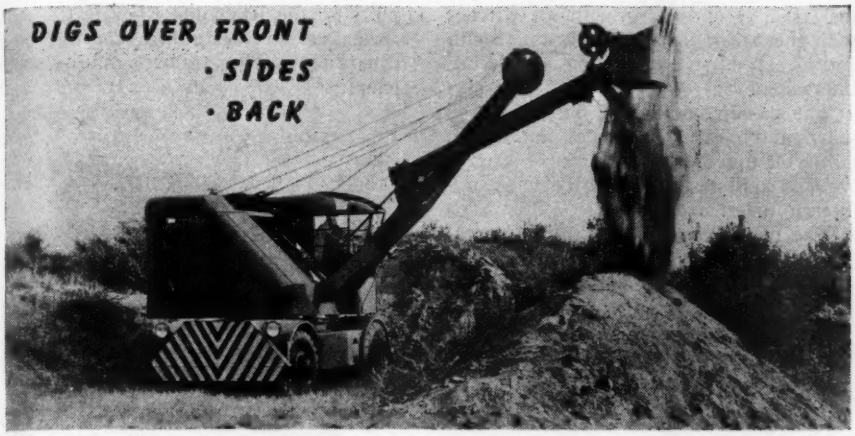
P — *Public Works*

21. Overcoming Some Incinerator-Dryer Troubles. By J. Kenneth Adams. Pp. 17, 20.
22. Catch Basin Capacities. Pp. 23, 26.
23. *n.* Notes Concerning Cortland, N. Y., Sewage Plant. P. 26.
24. British Ideas on Biological Filtration. Pp. 28, 30, 32, 34.
25. English Experiments With Straw-Sludge Fertilizer. Pp. 44, 46, 47.

Labor for Refuse Collection

"Labor has evidently been the most trying problem for most officials in charge of refuse removal," says a committee of the A.P.W.A., basing the statement on answers to a questionnaire from about 200 cities. In 138 of these, labor was less competent than before the war, and in 128 less cooperative. Wages have been increased in 153 cities, sick leave with pay granted in 88, vacation with pay in 91 and extra pay for more than the regular task in 92. Birmingham, Ala., pays a bonus of ½ day's pay per week for working full time six days a week.

Keeping Up With New Equipment



Byers Traveler one-half cu. yd. excavator.

Full Circle Shovel on Rubber

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It derives its name from its specially engineered heavy duty lower chassis which provides mobility, four-wheel drive traction and steering under the control of the same man who operates the unit as a shovel or crane. One-man control is acclaimed by the manufacturer as a high point of this self-propelled mobile excavator. Another is the short coupled lower chassis which permits 360 degree shovel operation.

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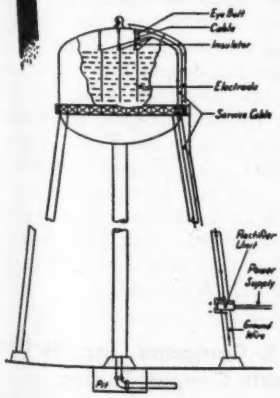

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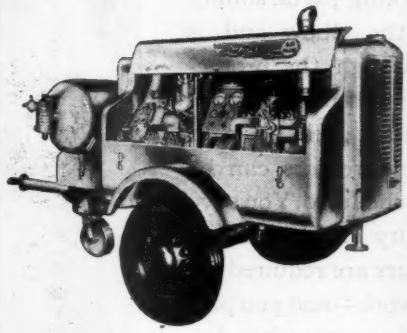

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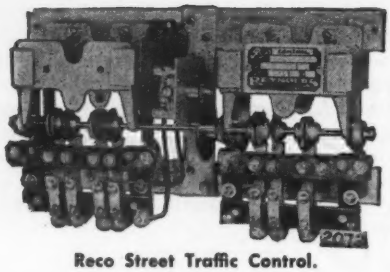


Reco Street Traffic Control.

For East and West Traffic, the green is on for thirty seconds, during the latter three seconds of which the amber is also on.

The green and amber switches to red with a left turn green arrow.

The arrow holds for 15 seconds and the red holds for 45 seconds.

Then the green arrow and red North and South signals switch to green North and South for 30 seconds, the red East and West remaining on.

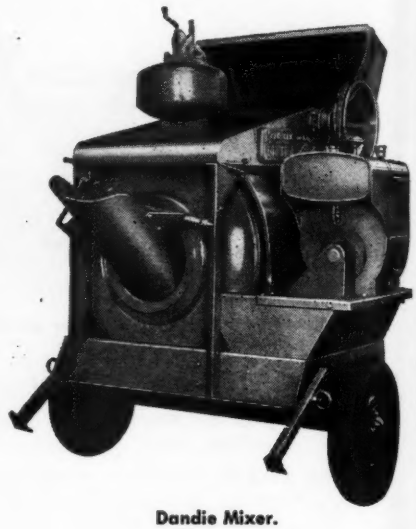
The amber light shows North and South traffic a coming change during the last 3 seconds of green and switches with the green to red North and South and green East and West, completing the cycle.

The flashing action of this control is sharp and clean, the amber and green going off together. The device is strongly built and designed to give long, uninterrupted service.

The new Reco Street Traffic Control is equipped with silver contacts. It has a synchronous motor for operating on 115 volt 60 cycle A. C. current. However, it can be equipped when so ordered with whatever number of circuits may be required and arranged for other current specifications and time cycles.

The above control was designed and built by the Reynolds Electric Co. who specialize in designing controls and timers for solving traffic signaling problems.

A BARREL OF SAVINGS
Here is a hydrant that can be replaced by two men in 15 minutes. No digging under the hot sun. No hammering away at frost-hardened ground. The barrel, containing all working-parts, simply unscrews at the elbow and is withdrawn through the protection case. A spare takes its place and the original goes back to the shop where repairs can be conveniently scheduled. You save your community money because fewer man-hours are required for maintenance work—and you provide better fire-protection because out-of-service time is kept at a minimum. For economy and efficiency, specify Mathews Modernized Hydrants.
MATHEWS HYDRANTS
Made by R. D. WOOD Company
400 CHESTNUT STREET, PHILADELPHIA 3, PA.
MANUFACTURERS OF SAND SPUN PIPE (CENTRIFUGALLY CAST IN SAND MOLDS) AND R. D. WOOD GATE VALVES



Dandie Mixer.

1-Bag Concrete Mixer

Kwik-Mix Company
Port Washington, Wis.

The Kwik-Mix 6-S Dandie has been announced by the Kwik-Mix Company.

Soon to be followed by new 16-S and 11-S models, the Kwik-Mix 6-S Dandie is welded throughout and utilizes high strength steel extensively. Strength is combined with light weight. A new selective skip shaker does not engage until the skip is partially emptied and ready for shaking.

The established Dandie Re-Mixing action, combining buckets and blades inside the drum, provides thorough mixing.

The tilted flow-line discharge chute, an exclusive feature on the Dandie Mixers, is said to empty the drum faster because it reaches deeper into the drum.

Controls are conveniently located for high speed operation. The Kwik-Mix 6-S Dandie is well balanced on automotive type leaf springs and pneumatic tires, trails fast and handles easily.

It mixes 6 cubic feet of concrete plus 10% and complies with the A.G.C. standards for this new size which replaces the 5-S and 7-S sizes.

Northrop & Company, Inc., to Distribute Copper Tubing

In line with its policy to furnish high grade water works specialties and supplies, Northrop & Company, Inc., 50 Church Street, New York, N. Y., announces arrangements have been completed to distribute to water departments and water companies the Chase Brass &

Copper Company line of copper tubing, fittings and water works brass goods.

While stocks are limited at the present time and it may not always be possible to make spot shipments, reasonable quantities of tubing are available. After all restrictions are lifted, Northrop & Company plans to warehouse copper tubing in other leading cities throughout the country to facilitate prompt deliveries. While copper tubing restrictions have been eased by W.P.B., utilities are requested when ordering this material to restrict their purchases to no more than sixty days requirements. Northrop & Company will keep up-to-date on priority regulations and will, upon application, be glad to furnish information in effect at all times.

Acco-Loc Safety Splice

American Chain & Cable Company, Inc., Bridgeport, Conn., announces the development of a new method for splicing wire rope into slings or various assemblies — a method which renders hand-tuck splicing obsolete.

This method develops a neater and more compact splice than is possible by the hand method. The splice is flexible clear to the terminal, and always develops 100% of the rope's strength. The Acco-Loc Safety Splice does not distort the rope structure and so maintains equalization of stresses in all strands. The splice applies the load stress in direct line with the pull of the load. It has no seizings to loosen, unravel or get in the way; no wire ends to barb and tear workmen's hands. At the present time the new Acco-Loc Safety Splice can be applied only at the factory.

Austin Co. Establishes An Aviation Division

Anticipating far-reaching airline and airport development work in the immediate future, George A. Bryant, president, announced establishment of a new Austin Aviation Division, with headquarters at Cleveland. The division will be headed by W. R. Engstrom, Austin Vice President, who has been district manager in the Pacific Northwest since 1933.

Active in various phases of design and construction of aviation facilities for commercial airlines, municipalities and the armed services out west for 20 years, Mr. Engstrom directed all the work on an $85,000,000 war contract under which Austin designed and built a large number of air stations, training fields, and seaplane bases for the Navy.

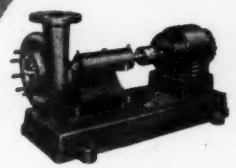
Mr. Bryant says, "We are setting up this new division to handle the specialized needs of the airlines, municipalities and governments, here and abroad. By channeling all of our airport reports and surveys, layout, engineering, construction and equipment problems through one central division, we plan to make the widest possible use of our

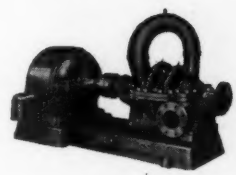
★ Complementing the eminent line of Peerless *Vertical* Turbine, Hi-Lift, Hydro-Foil, Jet and Water King Pumps, Peerless now manufactures *Horizontal* Centrifugal Pumps, formerly Dayton-Dowd.

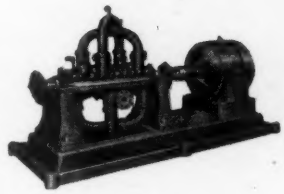
Peerless has acquired the Dayton-Dowd Company of Quincy, Illinois, which henceforth will be operated as the Quincy Works of Peerless Pump Division.

So now, regardless of the type of pump you need—Peerless produces it, giving you choice of *vertical* or *horizontal* design plus augmented hydraulic engineering service.

Advise us as to the type of pump desired—whether vertical or horizontal—capacity and lift. We will be pleased to submit full specifications and engineering details.







Peerless Pumps VERTICAL & HORIZONTAL

PEERLESS PUMP DIVISION Food Machinery Corp.
LOS ANGELES 31, CALIF. 301 W. Ave. 26 ★ QUINCY, ILLINOIS 2nd and York St. ★ CANTON 6, OHIO 1250 Camden Ave., S.W.

broad aviation experience over the past 27 years."

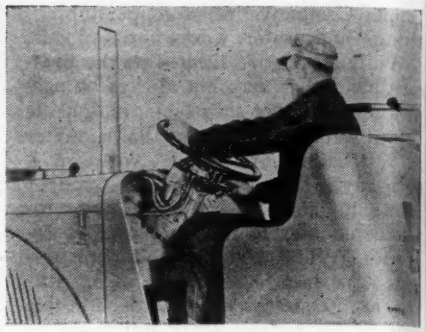
Mr. Engstrom is a civil engineer graduate of the University of Washington and joined the Austin organization in Seattle 20 years ago. He is a member of the American Society of Civil Engineers, a past president of its Seattle Section, and a member of Tau Beta Pi, national honorary engineering society.

Fingertip Steering for Giant Carriers Developed by Heil

The Heil Company
3000 W. Montana St.
Milwaukee, Wis.

The Heil Hydro Steer has no mechanical connections between the steering wheel and the axles. Impetus is transmitted through flexible ducts or hoses much the same as on conventional passenger cars. The steering head, to which the steering wheel is attached, contains a steering drive, metering pump, steering valve, relief valve, check valve and oil reservoir. From the oil reservoir in the steering head, the oil is drawn through a suction line to an engine driven hydraulic pump.

The steering wheel serves merely as the hydraulic control-valve lever for the power steer. When the steering wheel is turned to the right, the pump forces oil into the left-hand cylinder causing right-hand steering movement. For a left-hand turn the pressure is on the right-hand cylinder. Front wheels of the vehicle will remain in a locked position until the steering wheel is turned to allow a flow of oil in either direction. The metering pump gives a constant ratio between steering wheel movement and vehicle front wheel movement.



Heil Hydro Steer.

Practical applications of the Heil Hydro Steer include its use on earth-moving wagons, scrapers, graders, and other construction equipment, as well as on rear-steer units, such as fire engine ladder trucks, etc.

Aeroil Changes Name and Expands in Three Equipment Fields

Aeroil Products Company has been adopted as the new name of the organization formerly known as "Aeroil Burner Company," West New York, New Jersey. They have been manufacturers of oil-fired industrial equipment since 1917 and in recent years also in the gas-fired and electrically-heated equipment fields.

Production will be continued on the line of "Heet-Master Kettles" and No. 99 Weed Burners and Maintenance Torches" which represent a major portion of the production output of the three Aeroil plants in New Jersey, but added emphasis will be given to new types of equipment for which research and development is now under way.

The new name avoids the apparent contradiction in the word "Burner" as applied to the many different types of electrical units now being produced by them. The Army-Navy "E" award for excellence in production was awarded Plant No. 1 of this company in 1944. Aeroil maintains branch offices and warehouses in San Francisco, Chicago, and Dallas.

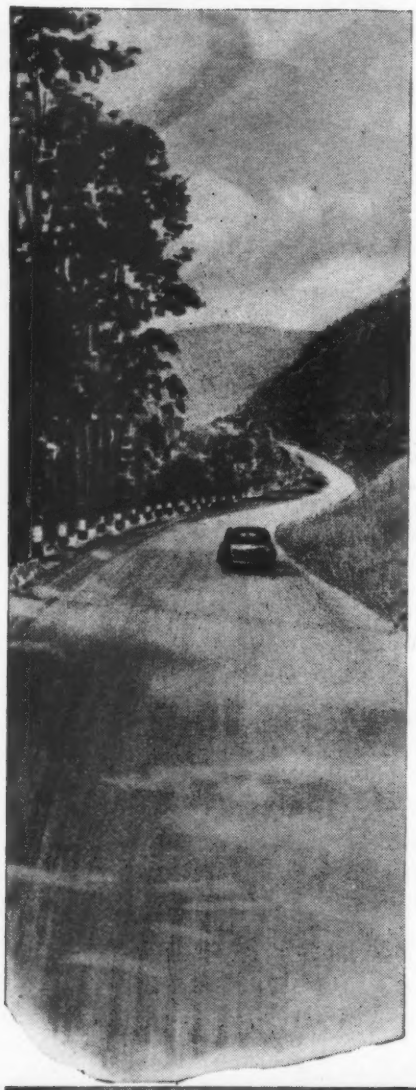
"Lubrikart" for Easy Lubrication

Alemite Division
2660 North Crawford
Chicago, Illinois

Designed to provide a complete, compact, portable lubrication with unique ability to transport and dispense a variety of grades or types of lubricants, a new Lubrikart has just been announced by the Alemite division of the Stewart-Warner Corporation.

The new unit, mounted on five-inch ball-bearing casters, is only twenty-one inches wide. It is thirty-one inches long

MORE AND BETTER ROADS
the Calcium Way



Local highway officials in many areas have worked wonders building good roads, The Calcium Way. They have built them with local labor and local soil materials treated with calcium chloride.

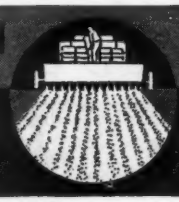
That's the way to get more and better roads for the money—the way to make low-cost roads give longer wear and satisfactory service — the way to make them dustless, smooth and clean.

Local soil materials, bound together with the moisture bond that calcium chloride supplies and holds, will compact under traffic into a consolidated mat. Such a roadbed sheds rain and lessens frost heaving. Properly treated with calcium chloride it does not dry out, so it cannot crumble and blow away.

This type of road can be built for less The Calcium Chloride Way. It can be maintained at a fraction of the cost of maintaining untreated roads and will provide the finest type of base for later concrete or blacktop paving. You do get more and better roads The Calcium Chloride Way. Bulletin No. 29 tells how. It is sent on request.

Calcium Chloride Association
4145 Penobscot Building
Detroit 26, Michigan

Dust is the cement in your gravel road
Save it with
CALCIUM CHLORIDE



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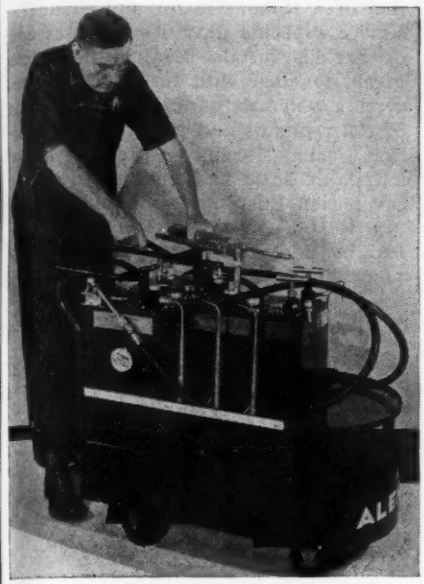

Alemite Lubrikart

and thirty-seven and a half inches high. Pushed like a perambulator, it is intended for one-man operation and is able to travel between rows of machines where space is limited.

The new Lubrikart comes in two models.

The basic model carries two seven-gallon tanks equipped with low pressure pumps with five and a half foot hose and non-drip nozzles for filling oil reservoirs on machines or hydraulic systems, and for filling gear housings; one seven-gallon tank with high pressure pump for loading handguns; two one and three-quarter gallon tanks with oil transfer pumps for filling oil cans; six spout-type oil cans, and four lever-type handguns. There is also space for waste, replacement fittings, small tools or other material.

The second model has, in addition to the foregoing equipment, a high-pressure, hand-operated grease pump which holds thirty pounds of lubricant and has a five and a half foot lubricant hose fitted with a hydraulic coupler. This pump develops up to 7,000 pounds of pressure per square inch, and can be lifted clear of the Lubrikart and carried to point of use, if desired. All pumps, loaders and transfers are manually operated.

Outstanding advantages of the Lubrikarts, according to Alemite engineers, are their ability to transport many types of lubricants and a variety of equipment for application of lubricants; high degree of maneuverability; time savings due to less frequent return to the oil storage room by the lubrication attendant, and greater assurance that lubrication will not be neglected by the attendant because of lack of proper lubricant or equipment at point of use.

Baty Promoted

Captain James D. Baty, Sn.C., of Sanitary Engineering Division, Surgeon General's Office, has been promoted to Major.

NEW CATALOGS

Below are described the latest catalogs received by PUBLIC WORKS. All are available free on request to the manufacturers whose names are given.

Corrugated Steel Sheet Piling

Caine Steel Company
1820 N. Central Ave.
Chicago 39, Ill.

In an 8-page folder this lightweight, maximum strength sheet-piling is described and line drawings show its use in construction of sewer and water lines, sewage disposal plants, filtration plants, dams, levees, coffer dams, bridges, etc.

Both standard and interlocked type sections are designed to give substantial watertight construction.

The manufacturers say it has been reused many times. Pulling tongs are provided which make it easy to pull the piling in good condition. Before buying piling write for this folder.

Conkey Sludge Filters

General American Process Equipment Co.
420 Lexington Avenue
New York 17, N. Y.

This folder briefly describes the background and factors affecting Sludge Filtration. A typical complete sludge filtration installation is shown and average results which may be anticipated in sludge filtration.

BUILT BY EXPERTS . .

This Duplex Hydraulic Scoop bears the stamp of an expert. A brief study of its features will convince you that it was made by a company which knows what a good scoop should do and how it should be made.

It is typical of the many pieces of WARCO earth-handling equipment which are available in variety and size to meet your needs.

For further information contact your nearest WARCO dealer or write to the W. A. Riddell Corporation, Bucyrus, Ohio

WARCO BUCYRUS OHIO

W. A. RIDDELL CORPORATION
BUCYRUS, OHIO, U. S. A.

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Why the Owner Profits

The importance of balance—between the capabilities of a machine and the requirements of the job—in the design and manufacture of the equipment itself between prime and auxiliary equipment —between cost, length of life, ease of maintenance and repairs and availability of parts and service—is stressed in a new "Caterpillar" booklet titled, "Why the Owner Profits."

This 16-page color booklet includes graphic illustrations of action covering a wide range of operations in all parts of the country. To obtain a free copy of this colorful book, request Form 8903 from Caterpillar Tractor Co., Peoria 8, Ill.

Care of Off-the-Road Tires

Believed the most comprehensive manual ever issued on the subject, a new 48-page booklet on "How to Get the Most Service Out of Your Off-the-Road Tires" has been published by the B. F. Goodrich Company, Akron, Ohio. Copies are now available upon request.

Off-the-road tires are becoming increasingly important to contractors, and others in whose activities vehicles are put through rigorous service away from improved roads.

The booklet first describes, with text and pictures, each of the off-the-road lines of tires the company manufactures for specific services. Reasons for particular constructions to meet the exacting requirements are explained. Hazards which meet each type of tire are pointed out, and methods to avoid them suggested.

Featured are 17 pages devoted to preventive maintenance. Among subjects are: "How Load, Inflation and Operating Conditions Affect Tire Cost," "Effects of Overloading," "Overinflation," and "Underinflation," "Bleeding Tires," "Care of Valves," "Haulage Roads," "Road Maintenance," "Hazard Areas," "Tire Clearance," and "Effects of Water."

Louisville Rotary Dryers

General American Process Equipment Co.
420 Lexington Avenue
New York 17, N. Y.

In a 6-page well illustrated folder the Louisville Dryers are described and illustrated in detail. Full information is given on the flexible Louisville design and manufacturing methods which enable purchasers to secure dryers that suit their particular purposes and needs, and which meet their own Engineering Department's ideas and experience, without heavy extra cost for special design and construction. Write for Bulletin 515-B.

Rotameter Catalog Contains Useful Selection Data

A new publication on Rotameters issued by Cochrane Corporation contains in addition to catalog material on the Cochrane line, helpful data on the selection of a Rotameter for any particular service. Specific gravities of gases and of various metals used in floats are given, together with formulae for converting water and air capacities to terms of other liquids and gases. Other selection factors, such as pressure drop, length of scale and float material are covered in this interesting publication, No. R-100A, a copy of which may be had by addressing Cochrane Corporation, Philadelphia, 32, Pa.

CONVENTIONS

Sept. 12-45—New England Sewage Works Assn. Holds Annual Meeting, Hotel Kimball, Springfield, Mass. Le-Roy W. Van Kleeck, Sec.-Treas.

Oct. 22, 23—Annual Water Conference of Engineers So. of Western Penn., Hotel William Penn, Pittsburgh, Pa.

"The Story of the Diesel"

In concise, non-technical, easy to read style, it discusses the Diesel's postwar future, its present fields of application and the beginning and development of the industry are also covered.

A chart depicts graphically the industry's enormous growth in horsepower-output from 1937 to 1944. In 1937 a production of barely 2,000,000 horsepower was recorded. This had leaped to 35,000,000 for last year.

A section describing opportunities for young men in the Diesel engine industry will be of special interest to returning war veterans, many of whom

Cleaned Sewers Make Contented Tax-payers

Above is the new Stewart catalog describing fully the full STEWART line. A postcard will bring your copy at once, without obligation.

You would prefer that your tax-payers be satisfied with the performance of their sewers. But one of the greatest causes of tax-payer irritation can be clogged-up sewers, operating at only partial capacities.

This source of dissatisfaction, however, need not plague you. With STEWART sewer cleaning equipment *your own forces* can restore every partly-clogged sewer to full efficiency. *But* there is a proper tool for every job. And the best way to be sure that you have have it is to check your own equipment with the new STEWART catalog. Just write us today for your free copy.

W. H. STEWART
P. O. BOX 767 SYRACUSE, N. Y.
"Since 1901"

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have had first-hand experience with Diesels in the armed forces. Copies can be had from Diesel Engine Mfrs. Assn., 1 North LaSalle St., Chicago 2, Ill.

News about PEOPLE

Cleveland Pneumatic Tool Company Promotions

Four executives of The Cleveland Pneumatic Tool Company have received promotions.

Elmer J. Steger, manager of the pneumatic tool and appliances division, has been appointed manager of the company's Cleveland Rock Drill division. Mr. Steger is executive vice-president and treasurer of the company's Canadian subsidiary, Cleveland Pneumatic Tool Co. of Canada, Ltd.

Mr. Charles E. Vanderpool, former assistant manager of the pneumatic tool division, has been made sales manager of that division. Mr. Albert H. Hruby, recently in charge of contract termination, becomes sales manager of the rock drill division, and Robert Craig has been named manager of export sales.

Mr. Vanderpool, a native Pittsburgher, became a salesman for Cleveland Pneumatic in the Pittsburgh territory in 1939 and district manager in 1941. He attended the University of Pittsburgh and Carnegie Tech. In January, 1945, he was appointed assistant manager of the pneumatic appliances division of the tool company.

Mr. Hruby, a graduate of the South Dakota School of Mines and Technology in Rapid City, South Dakota, came to Cleveland Pneumatic in 1934. In 1939 he was made field superintendent and later became assistant manager of the Cleveland Rock Drill division.

Robert Craig is the company's former district manager at Salt Lake City, Utah. He is a graduate of the Missouri School of Mines.

Robinson Newcomb Appointed Director of Research for Federal Works Agency

Major General Philip B. Fleming, Federal Works Administrator, announces the appointment of Robinson Newcomb as director of the division of research and statistics for the Bureau of Community Facilities, and economist to the Administrator.

Mr. Newcomb, since 1940, has been director of the division of construction research for the War Production Board. He is a native of Cleveland, Ohio, and came to Washington in 1924 as a student in the Brookings Graduate School of Economics and Government where he received his Ph.D. in economics. He attended Oberlin College and has taken graduate work at Ohio State and the Universities of North Carolina and Marburg a Lahn, Germany.

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B-31 (Truck Mixer Charging Plants)
C-34 (Portable Batching Bins)
B-19 (Steel Forms)

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Name_____

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(Type of construction usually engaged in)

Heltzel
BUILDS IT BETTER

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When you need special information—consult the classified READER'S SERVICE DEPT., *pages 71-73*

CONSULTING ENGINEERS

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J. E. SIRRINE & COMPANY
Engineers
Water Supply & Purification
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Stream Pollution Reports
Utilities, Analyses
Greenville — South Carolina

FOSTER D. SNELL, Inc.
An organization of 30 chemists and engineers having laboratories for bacteriology, analyses, research and Physical testing rendering
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Sewerage—Valuations—Rate Studies
Municipal Buildings
Central State Bank Bldg. — Muscatine, Ia.

HENRY W. TAYLOR
Consulting Engineer
Post War Planning
11 Park Place — New York 7, N. Y.

Fred. W. Deutsch

Fred W. Deutsch Associated With Builders-Providence, Inc. (Division of Builders Iron Foundry) Providence, As Assistant Sales Manager

In his new connection, Mr. Deutsch will be concerned with sales of Builders' well known Water and Sewage Works Equipment and also the Company's Recording, Indicating and Controlling Instruments as manufactured for industrial applications.

Born in Brooklyn, New York, Mr. Deutsch attended Stevens Institute and has since been actively associated in the municipal and industrial equipment fields. Mr. Deutsch will make his headquarters in Providence, Rhode Island.

Homer G. Turner Passes Away

H. G. Turner, Research Engineer of the Anthracite Equipment Corporation, died suddenly while on a business trip in Erie, Pennsylvania, on May 17, 1945. He had been connected with the Anthracite Equipment Corporation since 1934, making his headquarters at State College, Pennsylvania.

Mr. Turner became associated with anthracite research in 1927 and it was while conducting research on anthracite, largely with its fundamental physical properties and characteristics, that he developed its potentialities as a filtration medium. Further research under his direction led to the adoption of standard specifications for "Anthrafilt," an anthracite filter which he promoted widely throughout the country for use in swimming pools, city water supply systems and technical processes.

%Proportioneers, Inc.%, Opens New Office in Mexico City

%Proportioneers, Inc.%, Providence, R. I., U. S. A., makers of liquid proportioning equipment and chemical feeders, announce the appointment of %Dosificadores y Valvulas, S. A.%, Dolores No. 16, Mexico, D. F., to represent the Company in that territory. The new organization, headed by Mariano Lara and Manuel Garcia Sands, includes a factory-trained engineering staff and offers complete sales and engineering facilities to handle proportioning prob-

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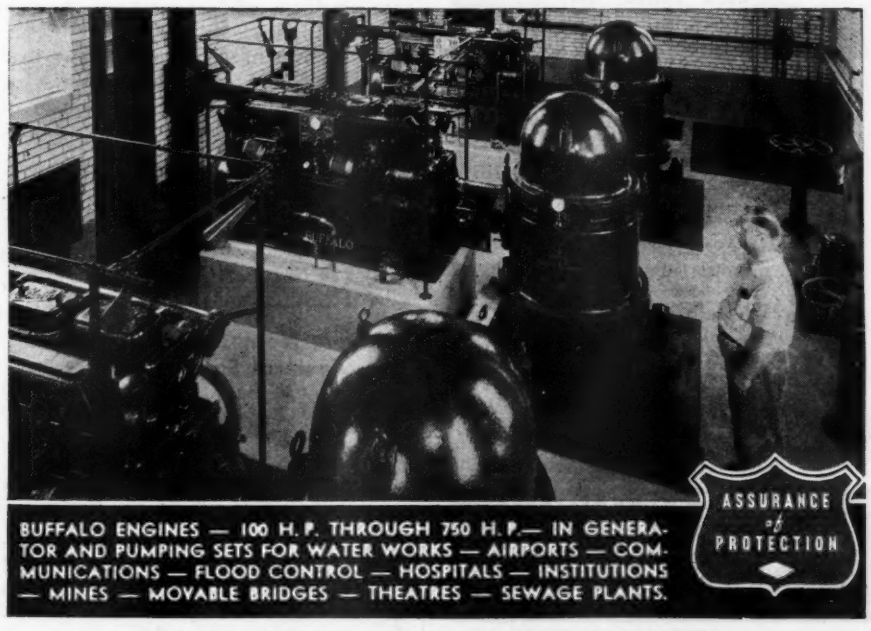

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lems. This new office will be the exclusive representatives for %Proportioneers, Inc.%, in Mexico.

New Dealer Appointments Announced by E. D. Etnyre & Co., Oregon, Illinois

A new office has just been opened in Washington 5, D. C., at 1018 Vermont St., N. W., under the direction of Mr. Charles T. Hvass, Vice-President, for the handling of governmental contracts, export business and eastern sales.

For the duration of the war Etnyre's New England office, under Mr. George E. Pearson, Vice-President and Eastern Sales Manager, will headquarter in the Boston office of Hedge and Mattheis Company. Hedge and Mattheis handle Etnyre equipment in several offices throughout New England.

Aldridge Equipment Company, 916 South State Street, Jackson, Miss., will handle sales of Etnyre Bituminous Distributors and Street Flushers.

The Michigan Tractor and Machinery Company has opened a branch office in Traverse City, Michigan and will act as dealer for Etnyre, there as well as in Detroit and Grand Rapids.

In Canada, E. D. Etnyre & Co. has completed arrangements for dealer representatives: in Nova Scotia, Coleman Machinery Co., Ltd., Halifax; in Ontario, Geo. W. Crothers, Ltd., Leaside, Toronto; in Quebec, Laurion Equipment Co., Ltd., Montreal; and in Saskatchewan, R. J. Fyfe Equipment Co., Ltd., Regina

Two Major Changes in Executive Set-Up by Food Machinery Corp.

Clarence M. Frazier, vice-president, who has headed Peerless Pump division of the corporation for the last 18 months, returns to the corporate headquarters in San Jose, Calif., to assume more important work in connection with the overall management.

Francis E. Fairman, Jr., formerly a General Electric executive, was named manager of the Peerless division and a vice-president of Food Machinery Corporation.

Mr. Fairman, who has had more than 20 years of engineering and sales experience behind him, is a graduate of the U. S. Naval Academy at Annapolis, Md.

The Peerless Pump division which he heads now has three factories in Los Angeles, Canton, Ohio, and Quincy, Ill., with sales offices in those three cities as well as in Fresno and Bakersfield, Calif., Phoenix, Ariz., and Plainview, Texas.

Myers Named LaPlant-Choate General Sales Manager

S. L. ("Sid") Myers, formerly Vice President in charge of Export Sales for LaPlant-Choate Manufacturing Co., Inc., of Cedar Rapids, Iowa, has been appointed Vice President and General Sales Manager.

Mr. Meyers has served LaPlant-Choate in various capacities for over 22 years, having started as a helper in the Machine Shop in 1923.

Jack C. Lyle

Lyle Joins Ludlow in Southeast

Jack C. Lyle, well-known in industries, municipalities and the jobbers trade throughout the southeast, has joined the Ludlow Valve Manufacturing Co., Inc., of Troy, N. Y., to take charge of its southern territory.

Mr. Lyle is a Mechanical Engineer, a graduate of the University of Tennessee, and has covered the southeast territory for some years as Representative and District Sales Manager for supply houses and manufacturers.

After completing several weeks of factory training at Troy, Mr. Lyle will make his headquarters at Atlanta. His territory is Georgia, Alabama, Western North Carolina, South Carolina, Eastern Tennessee and Florida.

Lead Industries Appoints Representative for Texas

Robert A. Camp, for the past ten years assistant plumbing inspector of Fort Worth, Texas, has been appointed a representative of the Metallic Lead Products Division of the Lead Industries Association, 420 Lexington Ave., New York 17, N. Y. Mr. Camp was both a journeyman and master plumber in Fort Worth prior to taking the position with the city inspection department. He also was instructor of plumbing apprentices at the Fort Worth Technical High School for several years. He is a member of the American Society of Sanitary Engineering, of Local 146 of the United Association of Journeymen Plumbers, and of a number of other trade and civic organizations. Mr. Camp will continue to make his headquarters in Fort Worth but will travel widely throughout the West.

Blaw-Knox Construction Equipment

A handy reference for those who want to keep up with the most modern forms of construction equipment, is contained in a new booklet just issued by the Blaw-Knox Company.

The 12-page pamphlet describes in detail such construction necessities as steel street forms, self-aligning steel forms, two-screed finishing machines, transverse blade concrete paving spreaders, batching and mixing plants, weighing batchers, turntables, concrete buckets, sheepsfoot tamping rollers, clam-

(Continued on page 74)

Meters, Gas

430. Bulletin No. 40-B-13, issued by Roots-Connersville, explains reasons for high accuracy and long life, low maintenance and operating costs claimed for their Rotary Positive Displacement Gas Meters. Contains size, capacity and dimension tables; efficiency curves. Write Roots-Connersville Blower Corp., 502 Valley Ave., Connersville, Ind.

Meters, Venturi

432. New bulletin illustrates Builders Air Relay system of transmission for the Venturi Meter which is particularly useful for liquids containing suspended solids like sewage. Eliminates corrosion, clogged pipes, etc. Write Builders-Providence, Inc., 9 Codding St., Providence 1, R. I.

433. "The Selection of Main Line Meters," a highly informative and useful presentation prepared by a competent engineer, J. C. Thoresen, describes forms of differential producers and quickly solves typical problems with the use of graphic charts. Write Builders-Providence, Inc., 9 Codding St., Providence 1, R. I.

Pipe, Cast Iron

437. Cast iron pipe and fittings for water, gas, sewer and industrial service. Super-deLavaud centrifugally-cast and pit-cast pipe. Bell-and-spigot, U. S. Joint, flanged or flexible joints can be furnished to suit requirements. Write U. S. Pipe and Foundry Co., Burlington, N. J.

438. "Cast Iron Pipe and Fittings" is a well illustrated 44 page catalog giving full specifications for their complete line of Sand Spun Centrifugal Pipe, Fire Hydrants, Gate Valves, Special Castings, etc. Will be sent promptly by R. D. Wood Co., 400 Chestnut St., Philadelphia 5, Pa.

439. McWane Precaulked Joint Cast Iron Pipe, in all sizes from 1¼ through 12 inches for water and sewerage, equipped with various type of factory-made joints, as well as B. & S. joints. Illustrated booklet issued by McWane Cast Iron Pipe Co., Birmingham, Ala.

Pipe Forms

440. Making concrete pipe on the job to give employment at home is the subject of a booklet by Quinn Wire & Iron Works, 1621 12th St., Boone, Ia., manufacturers of "Heavy Duty" Pipe Forms. Sent promptly on request.

Pipe Pusher

444. One-man-operated Hydraulic Pipe Pusher pushes pipe through ground under streets, sidewalks, lawns and other obstacles. Pays for itself in man hours saved on first few jobs. For complete facts and prices, ask for booklet S-117. Greenlee Tool Co., 2042 Columbia Ave., Rockford, Ill.

Pipe, Transite

445. Two new illustrated booklets, "Transite Pressure Pipe" and "Transite Sewer Pipe" deal with methods of cutting costs of installation and maintenance of pipe lines and summarize advantages resulting from use of Transite pipes. Sent promptly by Johns-Manville Corp., 22 East 40th St., New York 16, N. Y.

Pipe Joints, Sewer

447. How to make a better sewer pipe joint of cement—tight, minimizing root intrusion, better alignment of joint. Permits making joints in water-bearing trenches. General instructions issued by L. A. Weston, Adams, Mass.

448. Asphaltic Sewer Jointing materials are described and instructions for using them are included in a folder. Premoulded Sewer Pipe Belt, a modern method of jointing, a faster installation on the job, and Tufflex, a cold trowelling plastic for Sewer Pipe joints are the products. Write Servicised Products Corp., 6051 W. 65 St., Chicago 38, Ill.

Pipe Joint Compounds

450. The uses of Tegul-Mineralead for bell and spigot pipe and G-K Sewer joint compound are described in a 16-page illustrated booklet issued by Atlas Mineral Products Co., Mertztown, Pa. Includes useful tables for estimating quantities needed.

Pumps, Sludge

451. Carter Sludge Pumps are described in 8-page illustrated bulletin, including specifications and tables. Address: Ralph B. Carter Co., Hackensack, N. J.

452. Non-clogging, vertical or horizontal, dry pit or submerged; storm water and drainage pumps are described in several Bulletins; also sump and bilge pumps. Peerless Pump Div., Quincy, Ill.

Pumps and Well Water Systems

454. Installation views and sectional scenes on Layne Vertical Centrifugal and Vertical Turbine Pumps fully illustrated and including useful engineering data section. Layne Shutter Screens for Gravel Wall Wells. Write for descriptive booklets. Advertising Dept., Layne & Bowler, Inc., Box 186, Hollywood Station, Memphis 8, Tenn.

455. Peerless pumps in a variety of types, with oil or water lubrication and any power drive, to pump water from any depth are described and illustrated in new literature that clearly shows their construction and special features. Write Peerless Pump Div., Food Machinery Corp., 301 W Ave. at 26th St., Los Angeles 31, Calif.

456. Oil lubricated turbine pumps with open impellers. Five types of heads available. Specifications and illustrations in new bulletin 6930M-2 issued by Fairbanks, Morse & Co., 600 So. Michigan Ave., Chicago 5, Ill.

457. Centrifugal Pumps of various designs—single-stage, double-suction, split casing; single-stage single-suction; two-stage opposed impeller; three-stage; high-pressure; fire pumps; close-coupled. A bulletin for each type. Peerless Pump Div., Food Machinery Corp., Quincy, Ill.

Screens

460. Be assured of uninterrupted, constant automatic removal of screenings. Folder 1587 tells how. Gives some of the outstanding advantages of "Straightline Bar Screens" (Vertical and Inclined types). Link-Belt Co., 2045 W. Hunting Park Ave., Philadelphia 40, Pa.

Sludge Drying and Incineration

462. "Disposal of Community Refuse by Incineration" is a handsome 34-page booklet that discusses incineration from a commonsense standpoint. Illustrated by numerous photos of typical installations and includes diagrammatic outlines of various plant designs. Write Morse Boulger Destructor Co., 207-P East 42nd St., New York 17, N. Y.

463. Recuperator tubes made from Silicon Carbide and "Fireclay" Corebusters for maximum efficiency are described and illustrated in bulletin No. 11 issued by Fitch Recuperator Co., Plainfield National Bank Bldg., Plainfield, N. J.

Softening

466. This folder explains the process of Zeolite water softening and describes and illustrates the full line of equipment for that purpose made by the Graver Tank & Mfg. Co., 332 So. Michigan Ave., Chicago 4, Ill. Includes flow charts, tables and other valuable data. Write for a copy of this instructive folder.

467. Water Softening. The use of the Spaulding Precipitator to obtain maximum efficiency and economy in water softening is described in a technical booklet. Permutit Co., 330 W. 42nd St., New York 18, N. Y.

Sprinkling Filters

469. Design data on sprinkling filters of Separate Nozzle Field and Common Nozzle Field design as well as complete data on single and twin dosing tanks, and the various siphons used in them, for apportioning sewage to nozzles. Many time-saving charts and tables. Write Pacific Flush Tank Co., 4241 Ravenswood Ave., Chicago 13, Ill.

Stand-by Motors

471. Buffalo stand-by motors for generators or pumping units are covered in illustrated specification sheets sent promptly by Buffalo Gasolene Motor Co., Dept. PW, Buffalo 3, N. Y.

Swimming Pools

474. Data and complete information on swimming pool filters and recirculation plants; also on water filters and filtration equipment. For data, prices, plans, etc., write Roberts Filter Mfg. Co., 640 Columbia Ave., Darby, Pa.

475. A new illustrated bulletin on Graver Swimming Pool Equipment. Especially valuable to municipal and consulting engineers for use in writing up swimming pool specifications. Issued by Graver Tank & Mfg. Co., 332 So. Michigan Ave., Chicago 4, Ill.

Taste and Odor Control

476. "Taste and Odor Control in Water Purification" is an excellent 92-page, illustrated booklet covering sources of taste and odor pollution in water supplies and outlining the various methods of treatment now in use. Every water works department should have a copy. Write Industrial Chemical Sales Div., 230 Park Ave., New York 17, N. Y.

477. Technical pub. No. 207 issued by Wallace & Tiernan Co., Inc., Newark 1, N. J., describes in detail taste and odor control of water with BREAK-POINT Chlorination, a method of discovering the point at which many causes of taste may be removed by chlorination with little or no increase in residual chlorine. Sent free to any operator requesting it.

Treatment

479. "Safe Sanitation for a Nation," an interesting booklet containing thumbnail descriptions of the different pieces of P.F.T. equipment for sewage treatment. Includes photos of various installations and complete list of literature available from this company. Write Pacific Flush Tank Co., 4241 Ravenswood Ave., Chicago 13, Ill.

480. New booklet (No. 1642) on Link-Belt Circuline Collectors for Settling Tanks contains excellent pictures; drawings of installations, sanitary engineering data and design details. Link-Belt Co., 2045 W. Hunting Park Ave., Philadelphia 40, Pa.

481. New 16-page illustrated catalog No. 1742 on Straightline Collectors for the efficient, continuous removal of sludge from rectangular tanks at sewerage and water plants. Contains layout drawings, installation pictures and capacity tables. Address Link-Belt Co., 2045 West Hunting Park Ave., Philadelphia 40, Pa.

482. "Sedimentation with Dorr Clarifiers" is a complete 36-page illustrated catalog with useful design data. Ask The Dorr Company, 570 Lexington Ave., New York 22, N. Y.

483. A combination mechanical clarifier and mechanical digester. The Dorr Clarigester is explained and illustrated in a bulletin issued by The Dorr Company, 570 Lexington Ave., New York 22, N. Y.

484. Prefiocculation without chemicals with the Dorrco Clariflocculator in a single structure is the subject of a new booklet issued by The Dorr Company, 570 Lexington Ave., New York 22, N. Y.

485. New illustrated folder on Straightline apparatus for the removal and washing of grit and detritus from rectangular grit chambers. Address: Link-Belt Co., 2045 West Hunting Park Ave., Philadelphia 40, Pa.

486. 28-page catalog describes and illustrates the Dorrco Hydro-Treator, a self-contained water treatment unit combining Flocculation, Sludge Thickening and Clarification. Reduces treatment time and lowers plant construction costs. The Dorr Co., 570 Lexington Ave., New York 22, N. Y.

488. "Packaged" Sewage Treatment Plants, specifically developed for small communities — 100 to 3,000 population. Write for full description and actual operating data for this type of plant. Chicago Pump Co., 2438 Wolfram St., Chicago 18, Ill.

489. "Carter Controlled Flocculation" is title of illustrated folder available on request from Ralph B. Carter Co., Hackensack, N. J.

490. New bulletin fully describes and illustrates Hardinge sludge collectors for clarifiers, sludge concentration and skimming in both circular and rectangular tanks. Write Hardinge Company, Inc., York, Pa.

Underdrains, Trickling Filter

492. Illustrated bulletin describes the Natco Unifilter block of glazed, hard burned clay for underdraining filter beds. Write National Fireproofing Corp., Pittsburgh 12, Pa., for free copy.

Valves (See Gates, Air Release, etc.)

Water Treatment

494. New special folders contain the latest information on High Test Calcium Hypochlorite, Caustic Soda, Soda Ash, or Chloride of Lime as manufactured by Hood Chemical Co., 1819 Broadway, New York 23, N. Y. Write for desired folders, or use coupon in this section.

495. If you have a water conditioning problem of any kind, write Graver Tank & Mfg. Co., 332 So. Michigan Ave., Chicago 4, Ill., who manufacture all types of conditioning equipment and will be pleased to make recommendations.

496. "Use of copper sulphate in water treatment plants" titles informative booklet, with valuable data on chemicals, dosage, etc. Write Tennessee Corporation, Atlanta 1, Ga.

497. Ferri-floc Ferric Sulphate — a new, valuable booklet on coagulation for water and sewage treatment plants. Write Tennessee Corporation, Atlanta 1, Ga.

Water Service Devices

506. Data on anti-freeze outdoor drinking fountains, hydrants, street washers, etc., will be sent promptly on request to Murdock Mfg. & Supply Co., 426 Plum St., Cincinnati 2, Ohio.

Interchangeable Inner Parts

When you haven't time to write for parts—when speed is essential—just remember that the inner working parts of MURDOCK Outdoor Water Service Devices are interchangeable. Carefully machined; nicely finished.

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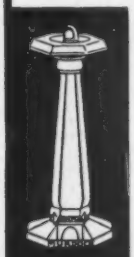

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(Continued from page 70)

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Each page is copiously illustrated with photographs, tables, and drawings, and contains considerable technical information of value to the user of construction equipment. It shows, for instance, by means of drawings and notes, the best manner in which to operate Blaw-Knox spreader vibrators in conjunction with Blaw-Knox finishing machines.

Of great interest are the two pages devoted to a description of the capacity, weight, and dimensions of various types of clamshell buckets, with instructions on the selection of the proper bucket for the proper purpose.

Not only is the book of help to those engaged in general concrete construction, but it also lists a complete line of equipment for the concrete paving of roads, streets, and airports. Copies may be obtained by writing to the Blaw-Knox Company, Blawnox, Pa., and asking for Bulletin No. 2036.

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